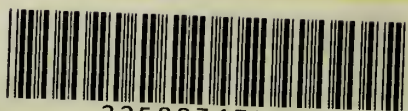


Artistic Anatomy

APPROVED BY  THE SCIENCE
AND ART DEPARTMENT

SPARKES



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A MANUAL
OF
ARTISTIC ANATOMY

FOR THE USE OF STUDENTS IN ART.

BEING A
DESCRIPTION OF THE BONES AND MUSCLES THAT INFLUENCE
THE EXTERNAL FORM OF MAN.

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APPROVED BY THE SCIENCE



AND ART DEPARTMENT.

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INTRODUCTION.

THIS book has been compiled because the writer felt that there is no work on Artistic Anatomy which gives with sufficient fulness the information the artist requires. On the one hand there are orderly and elaborate works written for the surgeon and student in medicine, on the other the mere lists of bones and muscles which are contained in the works written for the artist.

It is hoped that this manual will avoid both the extreme of minuteness and that of superficiality.

The method of study to be pursued by the student should be one that will utilize the written description, while actually drawing the skeleton, so that each projection, groove, or other peculiarity that is mentioned in the book, may be observed on the bones, and indicated in the sketch of the student.

As to the muscles, it is difficult, and often for the artist impossible, to study them in the dissecting-room; therefore drawings should be made from the plates. In doing this, the student should be very careful to become acquainted with the origin and insertion of the muscle under observation, so as to trace the course it must necessarily take in passing from one point to another. This observation should be verified on the model if possible; at any rate, the form of each muscle in the casts from antique statues that are in common use in our schools should be carefully followed.

Only those depressions, ridges, expansions,

or other points of interest which have any importance for an artist are dwelt upon; these are of consequence, either because the bone is near the surface of the body, and thus directly influences the form, or because the elevations, ridges, or processes are necessary to be known, that we may follow the direction and destination of muscles which are attached to them.

The student in the life school is advised to make anatomical sketches of the living model he is drawing; this is best done away from the model. The sketch should be compared with the work done from nature, and should be corrected by reference to the model. The same practice, to some extent, may be followed by the students in the antique school, though the conventional form of portions of the casts from the antique is often a source of difficulty to the student.

It may be necessary to remark that, although the artist's study of anatomy should never cease, it is not so important a subject as to demand from the young painter time that would be better spent in acquiring the handicraft of his profession; also that highly finished drawings are not necessary for the intelligent study of this subject, and that when a knowledge of the bones and muscles is gained, it is but one of the aids towards the full education of the artist's observation, not in any sense an end to his practical study.

J. C. L. S.

May 1st, 1888.

A MANUAL OF ARTISTIC ANATOMY.

. *The numerals in the margin are references to the Plates.*

THE BONES.

THE SKULL.

THE bones of the head and face are called the skull. It is divided into two sections; one is called the cranium, and one the face. In the cranium there are eight bones—1 Frontal, 1 Occipital, 1 Sphenoid, 1 Ethmoid, 2 Parietal, and 2 Temporal.

These are joined together at their edges by either overlapping and rough partly-jointed plates, or by a system of dovetailing into one another. These junctions are called Sutures.

I.—II. iii. 1.—The **Frontal Bone**, or bone of the forehead, forms the upper and fore part of the head; it extends a little towards the temples, and forms also the upper part of the socket of the eye.

IV.A. ii.— 2.—The **Occipital Bone** is so called II. i. from its forming all the occiput or back of the head; much of this bone forms the base of the skull, and lies in the neck so deeply as to be hidden by it.

3.—The **Sphenoid Bone** is a large irregular bone placed across the skull between the occipital and the ethmoid bones; it lies over the top of the throat, so that its processes form the back of the nostrils and roof of the mouth; it is so placed as to support the very centre of the brain.

4.—The **Ethmoid Bone**, like the last, lies in the base of the skull, and is invisible in the living form; it is a small square bone, and a mass of cells. It lies over the nose, and is an important part of that organ; it supports a part of the brain. The nerves that supply the nose pass through it at many points and perforate it like a sieve; it takes its name from this perforated or ethmoid plate.

II. ii. 5 and 6.—The **Parietal Bones** are two large and flat bones which form the sides and upper part of the head; they are the walls or sides of the cranium.

I.—II. iv.— 7 and 8.—The **Temporal Bones** III. i. form the lower parts of the sides of the cranium. They are called temporal, from the

hair that covers them being the first to turn gray, marking the advance of life.

The sutures for our purposes are usually reckoned as seven in number. They are serrated seams between the bones.

1.—The **Coronal Suture** is that I.—III. i. which joins the frontal to the parietal bones; it extends almost directly across the head from ear to ear; it descends behind the eye into the deep part of the temple, and there losing its serrated appearance, becomes like the squamous or scaly suture at the edge of the temporal bones. It is named coronal because, it is said, the ancients wore their garlands on this part of the head.

2.—The **Lambdoidal Suture** is III. i. that which joins the parietal to the occipital bone. It begins behind one ear, ascends and arches over the occiput, and descends behind the other ear. It thus strides over the occiput in a form somewhat resembling the letter Lambda, Λ , of the Greeks, hence its name.

3.—The **Sagittal Suture** joins the parietal bones together; it runs on the very top of the head, and extends forwards from the lambdoidal suture till it touches or sometimes passes the coronal suture, and from lying between these two sutures, like an arrow between the string and the bow, has been named sagittal.

4.—The **Temporal Sutures** join I.—III. i. the temporal bones to the parietal, occipital, and by the sphenoid to the frontal bones. The sphenoid enters into the temporal suture just behind the eye. It describes an arch corresponding almost with the arch of the external ear, and meets the coronal suture an inch before the ear, and the lambdoidal an inch behind it. The edge of the temporal suture is thin, and like scales of armour, as to its overlapping; it is called on this account the squamous or scaly suture.

5.—The **Sphenoidal** and **Ethmoidal** sutures are those which surround the many irregular pro-

cesses of these bones, and join them together and to other bones.

6.—The **Transverse Suture** is one which, running across the face and sinking down into the orbits, joins the bones of the cranium to the bones of the face, but with so many irregularities and interruptions that the student will with difficulty recognise a definite line of suture.

7.—The **Zygomatic Suture** is one which joins a branch of the temporal bone to a process of the cheek-bone forming the zygoma, or yoke.

There are many others of small importance to artists. These mainly lie between the bones of the face; others quite surround pieces of detached bone which lie in their course, and are called Wormian bones.

It is not very clear what the use of the sutures is. They are always in their place, and have some effect on the external form of the skull; for that reason they are introduced here.

Now, take the bones of the skull a little more in detail, but in the same order as before—that is, the single bones before those that come in pairs. The most important to an artist, as it is the one most

I.—II. iii. constantly seen and painted, is the

—III. i. **Frontal Bone.** It is, when detached from the skull, like a shell in shape, and of even thickness. In the dissected bone, that is one that is removed from its connections, observe the three thicknesses of which the bones of the skull consist, the outer and inner tables, as they are called, with the cancellous structure between.

Inside, observe a ridge which divides the bone into equal halves for the attachments of the falx of the brain.

Outside, there are the *frontal sinuses*, or cavities. They are formed by the receding of the two tables of the skull from each other; sometimes they are of large size, even extending over the whole surface of the frontal bone; they are small or absent in women and children, and are largely developed in men. They communicate with the nose and similar spaces in the ethmoid, sphenoid, and upper maxillary bones, so as to form a large surface; probably to them is due the greater power and volume of the masculine voice; at any rate, the resonant power of the voice is materially injured when these sinuses are obliterated in cold or other disorders of the nose. Their large development gives a stern expression to the face, and a frowning one to the skull in which they are seen. From the internal table two horizontal plates of thin bone, called the orbitary processes, stand out,

forming the floor of the brain and the roof of the orbit; a space between them indicates the position of the ethmoid bone.

Observe the *superciliary ridge* on which the eyebrows are placed; it is a prominent arched line, corresponding in size and length with the eyebrow it supports; it is the origin of the frontal muscle. There is a notch, and more frequently a hole, through its edge, for the passage of an artery and nerve which come out from the orbit, and are distributed over the forehead. At their outer extremities are found the *external angular processes*, behind which the bone lies flat and sunk into a hollow which lodges the temporal muscle. Between the two *internal angular processes* is the *nasal process*, a sharp projecting spine, irregular and rough all round its root, for supporting the two nasal bones, which gives them a firm and secure attachment. In the orbitary plate, and behind and under the superciliary ridge, are two depressions in the socket of each eye. One small and deep, towards the corner of the eye, is the mark of a small cartilaginous pulley, in which the tendon of one of the muscles of the eye plays; the other, a more gentle and diffused hollow, lies under the external angular process, and is the place where the lachrymal gland lies, the gland which secretes the tears and keeps the eye moist.

There are two bumps, one on each side of the middle of the forehead; these are traces of the centres of ossification from which the bone was deposited when changing from a cartilaginous state to that of bone. Sometimes a frontal suture runs up the centre of this bone, and gives it a projection on its middle line, quite observable in nature.

The **Occipital Bone** is an irregular bone, being at once the thickest, and at other parts the thinnest of the bones of the skull. There are ridges internally for the attachment of the membranes dividing the brain, and depressions for the lodgment of veins and vessels of the brain. The most important character of the bone is taken from the hole, or *foramen magnum*, which transmits the spinal marrow or continuation of the brain. Behind this hole, the rough part of the bone, that is in the thickness of the neck, is seen; it is divided into certain strong ridges for the attachment of the large muscles of the neck. There are two main ridges, one at the outer subcutaneous edge, in the middle of which the *posterior protuberance* is felt; the second is, roughly speaking, parallel to it, but

more within, and these are crossed by the *crucial spine*. The processes are, the *cuneiform process*, which runs wedge-shaped into the sphenoid, and two important processes called the condyles of the occipital bone; they are oval or bean-like projections, standing on each side of the great hole; their fore ends are turned towards each other, so that the head hinges on them in such a manner that it nods directly forward or backward, but cannot turn or roll. The turning motions are performed by the first bones of the neck.

The **Sphenoid** is, fortunately, not necessarily important to artists; still, it is as well to remark that it consists of a body and two larger wings. The two wings appear, as to their external smooth surface, in the temporal fossa, and form part of the squamous suture; and the face of the wing of the sphenoid forms a part of the orbit, and the lower parts of the bone form the pterygoid processes.

The **Ethmoid Bone** forms the inner wall of the orbit, and has already been sufficiently described.

I.—II. ii. The **Parietal Bones** are, roughly speaking, square, surrounded by deeply-cut edges, which unite them together and with the occipital and frontal bones. The lower edge is a concave semicircle; this edge is so sharply cut away that it is overlapped by the squamous edge of the temporal, as by a thin scale. About an inch above the squamous suture there is a semicircular ridge where the bone is white and hard, and rays extend downward from this, converging towards the jugum, yoke, or arch of the temple. This white line represents the origin of the temporalis muscle, and the converging lines express the manner in which the fibres of this muscle are gathered into a smaller compass to pass under the zygoma.

The imperfect meeting of the frontal and parietal bones in young children leaves an interstice, which is called the *folium*, from its trefoil or leaf shape; also called the *fons* or *fontanelle*, or *bregma*, as the ancients thought the space served to drain off moisture from the brain; hence in some old books the parietal bones are called *ossabregmatis*.

I.—II. iv. —III. i. The **Temporal Bone** consists of two parts; one is called the *pars squamosa*, and the other is the *pars petrosa*. There is a third portion, viz., the mastoid, thick and hard and divided into cells.

The squamous part is grooved to make the squamous suture; it is scalloped and fringed, and thin on its upper edge; its radiated appearance is due to its ossification. The petrous portion is

triangular, unequal, hard, and shiny; it projects into the base of the skull.

There are three important processes.

1. The *Zygomatic Process* rises broad and flat before the ear, as it stretches forward to meet the cheek-bone, and with which it forms a I.—II. iv.—III. i. suture, forming with the process of that bone the zygoma, yoke, or arch of the temple, under which the temporal muscle plays.

2. The *Styloid Process*, so named II. iv. from its fancied resemblance to a stylus, or point with which the ancients engraved their writings on tables of wax. It stands out obliquely from the base of the temporal bone, and is behind the jaw; it gives origin to a ligament which goes down from it to support the *os hyoides*, or bone of the tongue; and it is the origin of many small muscles of the throat and jaws.

3. The *Mastoid Process* is a conical, II. iv.—III. i. nipple-like bump, which projects behind the ear under the skin; it is hollow, with many cells which adjoin the tympanum of the ear, and are thought to reverberate and strengthen sound. On its under surface is a deep groove which gives origin to the digastric muscle, and on the outer margin of its ridge the mastoid muscle is inserted.

The *Auditory Process* is the ring of bone which lies between the root of the zygomatic process and the mastoid process. The membrane of the ear is extended from the edges of this bone like the parchment of a drum on its hoops; the cartilaginous tube of the ear is fixed to it. There are many other details of great interest in this bone, which must be passed over.

The bones of the face are fourteen in number.

The **Nasal Bones** are two in I.—III. i. number; they are small and thin, having no cancelli, and may be regarded as firm condensed plates; they are convex outwards, and together form an arch. They have at the thick end a rough surface, by which they are strongly joined to a rough surface of the frontal bone; they are supported laterally by a projection of the upper jaw-bone, which, stretching upwards, is called its nasal process, and they lie with their edges under it in one part and over it in another, so that they cannot easily be forced in. Their lower edge is rough and jagged for the firmer attachment of the cartilages of the nose, the junction forming what is exteriorly the "bridge of the nose."

The **Lachrymal Bones** are two; they lie just within the orbit, touching the nasal process of

the upper jaw. Each is pierced by a canal or tube, which conveys and protects the lachrymal sac, by which the tears are conveyed from the eyelids to the cavities of the nose.

I.—III. ii. The **Upper Jaw-Bones** are two in number, and form the basis of the face. They send a large process or branch upwards to form the sides of the nose. A broad plate goes backwards to form the palate; below is a horseshoe-like projection containing the alveoli or sockets for the teeth. These bones are hollow within, forming a large cavity, and the size of this cavity determines the height of the cheek-bone and form of the face. The surfaces of these bones are the malar, the orbital, the nasal, and the palatine. These names sufficiently indicate the connections of the bone. The sockets of the teeth are as deep as the fangs of the teeth are long. They are formed with the teeth, and are absorbed and carried away when the teeth fall out in old age; they are thin, and closely surround the teeth.

The two **Palate Bones** lengthen the palate, and complete the nostrils or space for the inner nose behind; they even extend upwards into the socket for the eye, so as to form a part of its cavity.

The two **Spongy or Inferior Turbinate Bones** form a pair of rolled slightly formed bones in the cavity of the nose.

III. i. v. The **Malar or Cheek Bones** are square projections, forming the projections of the cheeks. Each has four distinct points; one joins the zygoma, others form the outer and lower margin of the orbit, they largely articulate with the upper jaw.

The **Vomer**, or ploughshare bone is single, and divides the two nostrils from each other. It is so securely joined posteriorly to the sphenoid and ethmoid bones, as to be capable of resisting violent blows; below, it rests on the palate plate of the upper jaw.

1.—III. iii. iv. The **Lower Jaw** is the second single bone; a knowledge of this bone is of great consequence to the artist. It is divided into three parts: the chin—that is, the part which lies between the two mental foramina—the ramus or base or sides of the bone, and the upright portion.

The chin is a human characteristic, and gives a manly squareness to the face.

The base terminates the outline of the face. It is clearly traced along its course from the chin to the angle. The angle is where the base ends, and

the bone rises upwards at right angles to be articulated with the head. The roughness on the angle marks the place of insertion of the I.—III. iii. masseter muscle. There are two processes at the upper end of the bone, the coronoid process, and the condyloid process. The temporal muscle is attached to the first; a semilunar notch separates it from the latter process, which articulates with the temporal bone.

The alveolar processes, like the bone in the upper jaw, enclose the teeth. The successive changes of the form of the jaw are necessary to be known. In the young child, the jaw consists of two bones joined slightly at the chin, and, during childhood, the processes are blunt and short, and do not turn up with a strongly-marked angle, but go off obliquely from the body of the bone. The teeth are not rooted, but stick superficially into the alveolar processes, having another set below them, ready to push them out from the jaws.

In youth, the alveolar processes are extending, and the teeth increasing in number. The coronoid and articulating processes are growing acute and large, and are set at right angles to the bone. The teeth are now firmly rooted, for the second set has grown up from the body of the jaw.

In manhood, the alveolar processes are still more elongated, the wisdom teeth are added at the end of the row, and often in space so small for them that they have but a short existence. In old age, the jaw, from the loss of teeth, falls flat, and shrinks by the absorption of the sockets to half its depth; the coronoid processes rise at an acute angle from the jaw-bone, and the projecting tip of the chin gives the nut-cracker character to the face often seen in extreme old age.

There are thirty-two teeth, sixteen in each jaw. There are eight incisors, which are the cutting teeth; they usually overlap one beyond the other set. Also four canine teeth, larger and more deeply inserted than the incisors; these teeth receive large development in the carnivorous animals, and in the tusks of boars and some other creatures. Eight bicuspid teeth intermediate between the canine teeth and the molars, which are twelve in number. The teeth of a man are peculiar in being all on a level, and more nearly of one length than in any animal. No doubt the front teeth have a very decided use in human speech. As a whole, they indicate that man is fitted for a mixed diet and great variety of food.

THE TRUNK.

The trunk consists of the spine, with its attachments the ribs, and the pelvis.

The spine is so called from certain projecting points of bone, which, standing outwards in the back, form a continuous ridge, and the appearance of continuity is so complete, that the whole ridge is named spine; this is commonly spoken of as if it were a single bone. This long line consists of twenty-four distinct bones, called *vertebræ*, from

the Latin *vertere*, to turn. They protect

IV. the spinal nerve, or marrow, as it is sometimes called, throughout its whole length, and support the whole weight of the trunk, head, and arms; they perform at certain points the chief turnings and bendings of the body, and do not suffer under the longest fatigue, nor the greatest weight the limbs can bear. Nothing can be more perfect than this combination of the most opposite and inconsistent functions in our set of bones, for these bones are so free in motion as to turn continually, yet so strong as to support the whole weight of the body, so flexible as to turn quickly in all directions, yet so steady within as to contain and defend the most material and most delicate part of the nervous system.

The **Vertebræ** are arranged into sections, which belong to the back, neck and loins, and the number of them corresponds with the length and proportions of these divisions. The *vertebræ* of the **loins** are five in number, very large and strong, and bearing the whole weight of the body. These

IV. processes stand out wide and free, and the bones perform the chief motions of the trunk.

The *vertebræ* of the **back** are twelve in number: they are also large and strong, yet smaller than those in the loins; their processes are laid over each other, each bone being thus locked in with the next; they are also so connected with the

IV. ribs as to become the steadiest part of the spine; a very limited motion is possible.

The *vertebræ* of the **neck** are seven in number; they are more simple, their processes hardly project; they are loose and free, and their motions are the widest and easiest of all the spine.

IV. A. i. iii. Thus it is seen there are twenty-four *vertebræ* to the spine.

Every *vertebra* consists of a body, which is firm, supporting the weight of all that is above it, and hollow behind for transmitting the spinal marrow;

of two articular processes above, and two below, by which it is jointed with the bones which are above and below it; of two transverse processes, which stand out from either side of the bone, to give attachment to those muscles which turn the spine; and of one process—the spinous process, which stands directly backwards from the middle of the bone. These processes, being felt in distinct points all the way down the back, give the whole the appearance of a ridge, whence it has the name of spine.

The **Body** of a *vertebra* is the chief mass of which it is composed; it V. i. ii. iii. iv. is of soft spongy bone, convex to the front, flattish at the sides, and hollowed into a concavity behind to give the shape of the tube in which the spinal nerve is contained. It has but a thin scaly covering to its cancellous structure. It is tipped with a harder ring above and below, and within this ring the top and under surfaces are hollowed out into a sort of shallow cup, which receives the intervertebral substance by which the next *vertebræ* are joined to it above and below it; they work thus on a sort of pivot.

The body bears the weight of the trunk, head and shoulders, and upper extremities, and all the loads these parts may put on it. It is, therefore, largest in the loins, where most weight rests upon it; smaller in the back, and least in the neck, where there is a constantly diminishing load to carry.

The body of each *vertebra* sends out two arms, which, meeting behind, form, with the concavity in the body just mentioned, the arch or the canal for the spinal marrow.

The **Articular Processes** are pro- V. i. ii. iii. iv. jections standing out obliquely from v. vi. the body above and below, by which and by the intervertebral substance it is joined to the *vertebra* above and below it.

The **Spinous Processes** are those which project directly backward from V. ii. iii. iv. v. the middle of the arch and opposite the body.

The **Transverse Processes** stand V. i. ii. iii. iv. out from the sides of the arch at right v. vi. angles, or transversely with the body.

These processes are so many handles or levers, by which the spine is moved; by their size, the muscles take firm hold of them; by their length they give the muscles a powerful lever to work with. The spinous processes are connected with a ligament, which, running the whole length of the spine, checks the bending of the trunk forward.

They and the transverse processes also serve as the attachments of the muscles which extend the spine and keep it erect on the body. There are particular modifications of these characters in each section of the column, as for instance :

IV.—V. iii. In the **Vertebræ of the Loins** the perpendicular depth of the *body* is short, the intervertebral substance thicker than in other parts of the spine, and the processes stand off distinct and clear, providing for a free motion in the loins.

The spinous process is short and strong, and runs horizontally backwards from the arch ; it is flattened from side to side, and is terminated by a roughness or knob for the attachment of strong muscles.

The transverse processes are longer and finer than in the other vertebræ ; they stand out laterally and horizontally, and give origin to strong muscles.

The articular processes stand directly up and down ; they are tuberculated and strong, in common with the general character of these bones.

IV.—V. ii. The **Vertebræ of the Back** are different from those of the loins. The *bodies* are smaller and deeper, proportionally to those of the loins, and the intervertebral substance is thin, for there is little motion here.

The spinous processes are long and aquiline, broad at their base and smaller at the other end ; they are bent down on one another, and lap over one another like scales in armour, the one above nearly touching the one below, by which arrangement the motion of the back is much abridged ; and the further to secure the column, a groove on the under surface of the spinous process receives the upper edge of the one below it.

IV.—V. ii. The **Transverse Processes** are short and knobby ; they stand obliquely backward, and are restricted in their movements by the ribs, which not only lodge against the bodies of these vertebræ, but also are firmly attached by ligaments and by a regular joint to the transverse process of each vertebra. A mark by which these vertebræ may be known is a double depression, above and below, at the lateral edge of the body, where the head of the rib is attached, its further attachment being the transverse process. At their extremities a tubercle, for the attachment of muscles, is seen. The first vertebra of the back has the whole head of a rib impressed in its side ; the last vertebra also has the same mark, but it has on articulating surface on its transverse process.

The articular processes are short, and form a part of the transverse ; these surfaces are more oblique, smoother and simpler than those of the loins.

The **Vertebræ of the Neck** depart IV.—IV_A. still farther from the form of those of i. iii. the loins. The *body* is small ; in the uppermost there is no body, as it is attached to that of the next below it. There is no cupping to allow of the intervertebral substance being deeper in the middle, as with the others ; the *articulating processes* are oblique, and more or less in the plane of the body. The *spinous processes* are short, and project directly backward ; they are split, and have small tubercles on their double extremities, for the attachment of muscles. This bifurcation of the cervical vertebræ is not absolutely peculiar, for sometimes others of the back are so, and it is only in the middle of the neck that they are forked ; for the first vertebra is a ring, and the spinous process of the last is not bifurcated, so that it resembles those of the back. It is long and aquiline, and is so much larger than the others, as to be distinguished by the name of *Vertebra Prominens*.

The transverse processes are grooved and bifurcated, and each is perforated by a hole for the transmission of the *vertebral artery*, which is thus protected by a bony canal. The first and last are sometimes not thus pierced.

The two vertebræ which require special remark are the first, or *Atlas* ; IV.—V. v. vi. and the second, called the *Dentata*, or *Axis*.

The atlas carries the globe of the head, which is placed immediately upon it. It has no body, and has a tubercle instead of a spinous process ; its transverse process is long, perforated, but not forked. The inner surface of the front of the ring has a smooth flat surface, polished for the rolling round in it of the tooth-like process of the axis.

On each side of this surface two small points are seen ; they give origin to a ligament, which divides the ring into two openings. One, the smaller, for lodging the tooth-like process, embraces it closely ; the other and larger opening is for the spinal marrow ; the transverse ligament thus confines the tooth-like process. The articulating surfaces are two on each side, one pair looking up- IV_A. ii.—V. vi. wards, by which it is joined to the occipital bone, the other looking downwards, by which it is joined to the second vertebra. The two upper articulating surfaces are oval and slightly hollow ; they are also oblique, for the inner margin of each dips downwards, and the

outer margin rises upwards, and the front end of each oval is turned a little towards its fellow. Now, by the obliquity of the condyles and their sockets all rotatory motion is prevented, and the head performs on this articulation only the nodding movement. When it rolls it carries the first vertebra along with it, moving round the tooth-like process. The articulation of the head is thus a hinge joint.

The lower articulation with the vertebra dentata being secured already by the tooth-like process, no other property is required in the lower articulating surface of the atlas than that it should glide with perfect ease, for which purpose the two surfaces are plain and smooth.

The **Vertebra Dentata**, **Odon-**
IV.A.—V. v. **toides**, or **Axis**, is so named from the projecting point that characterizes this bone. This tooth-like process is large, thick, and like a little finger; it has a rough point, from which a ligament goes upwards, by which the bone is tied to the great hole of the occipital bone. Observe a neck or smaller part near the root of the tooth-like process, where it is grasped by the transverse ligament of the atlas, while the point of the process swells out a little above. This neck is smooth, for it is upon this point that the head continually turns. On each side of the tooth-like process is a broad articulating surface. These surfaces are like shoulders, and the atlas, being threaded by the tooth-like process of the axis, is set flat down on the high shoulders of this bone, and there it turns and performs all the rotatory motions of the head. The lower surface is like an ordinary vertebra of the neck.

The spinous process is short and thick, yet still projects beyond those below it; it is turned downwards, to be out of the way of the atlas. The ring is deep and thick, and the opening is somewhat triangular.

In the spine the *intervertebral substance* is a very important feature. It is placed between the bodies of the vertebrae. It is a soft, pliant and perfectly elastic substance, softer towards the centre than at the edges, and confined to its shape by a sort of ligamentous band or bandage of enclosure. It yields to whatever impulse we give the body to one side or the other, and returns to its original shape when the pressure is taken off it. In leaping, in falls, in any exercise or accident giving shock to the bony skeleton, its elasticity prevents harm to the spine or brain. During the day it is continually yielding under pressure, so that we are

taller in the morning than at night; so also are we shorter in age than in the maturity of manhood, and the stooping of old age is caused by the yielding of this substance.

THE RIBS AND STERNUM.

The **Ribs** give form to the thorax, IV.—VI.—and cover and defend the lungs and VII. heart; they also assist in breathing, are joined to the vertebrae by regular hinges, which allow of short motions, and to the sternum by cartilages, which yield to the motion of the ribs.

Each rib may be described as a bone of some length, at one end of which there is a head for articulation with the vertebrae, and a shoulder or knob for articulation with the transverse process; at the other end is a socket for receiving the cartilage, which, in its turn, is implanted into a similar socket in the sternum so as to complete the form of the chest.

The ribs are twelve in number, according to the number of the vertebrae in the back; of these, seven are called *true ribs*, because their cartilages join directly to the sternum, and five are called *false ribs*, because their cartilages are not directly nor separately implanted in the sternum, but are joined one with another, the cartilages VI.—VII. of the lower rib being joined to that of the rib above, so that all the lower ribs terminate in one greater cartilage. But there is still another distinction; the last rib, and usually the rib above it, are not connected in any way with the sternum, but are loosely imbedded in the muscles VI.—VII. of the abdomen, whence they are called *floating ribs*.

The ribs are for the most part of flattened form, their flatness being turned towards the lungs; it is, however, not the flatness of a hoop, but is twisted as if each end of the rib had been seized and wrenched between the hands. They are a little rounded at their upper edges, sharp and cutting at the lower, which are grooved for the protection of arteries.

On a rib the following parts are found:

1. The *Head*, or round knob by which it is joined to the spine. The articulating surface is double, as the rib is implanted into the interstice between two vertebrae, and the head touches both, and rests on the intervertebral substance.

2. The *Neck* of the rib is the smaller part before the head; it is round and small, but about an inch

from the head there is a second rising or bump ; this is the articulating surface by which it touches and turns on the transverse processes of the vertebra below. Thus the head rolls on two points of contact with the vertebræ, and upon the transverse process, the whole upper end being otherwise fixed ; but the lower end rises or falls in a wide range of movement, which, from the obliquity of the rib, causes the depth from the spine forwards to be increased, and thus moves the sternum forwards.

3. The *Angle* of the rib is that part where it turns forward to form the sides of the chest ; it is beginning to be flattened here. There are various tubercles and ridges for the attachment of ligaments and muscles.

The ribs increase in their obliquity from the highest to the lowest, and their anterior extremities are more distant from each other below than above.

There are certain modifications in the individual ribs, the chief of which are : the length of the ribs increases from the first to the seventh, but again decreases from the seventh to the twelfth. The curve of the ribs decreases from above downwards, the first being short and circular, the lower ones longer and almost straight in some parts of their

course. Thus the thorax is, roughly
VI. speaking, conical, the upper end open, and so small as just to give passage to the trachea, œsophagus, and the great vessels : the lower opening is so large that it equals the diameter of the abdomen.

The first rib is consequently short, thick, strong, and flattened, above and below ; it has no angle, and has no twist in it ; it makes a curve of more than half a circle. The eleventh and twelfth ribs are small and delicate, and their cartilages are acutely pointed. The heads of the eleventh, twelfth, and first ribs are round, as they are articulated with the flat side of a vertebra only.

On the eleventh and twelfth ribs there are no tubercles for their junction with the transverse processes.

The cartilages of the ribs are to be noted. These are inserted into the sternum in round sockets, and between them all there is a certain movement. The direction the ribs take is thus observed : the first and second descend, the third is direct, the fourth, fifth and sixth rise upwards in proportion to their distance from the third.

By the motions of the ribs the thorax is dilated or diminished in capacity. The motion is double.
1. The sternal ends rise and fall, the centre of

motion being the articulation with the spine.
2. They move on their own axis. The former movement enlarges and decreases the diameter of the thorax from the spine to the sternum ; the latter enlarges the lateral diameter of the thorax.

The **Sternum** is the sword-shaped
VI. bone which lies in the front and middle of the thorax, and by its articulations with the cartilages of the ribs completes it. It defends the heart, and its top end is a fulcrum for the clavicles to act against.

There are, in adult life, three pieces
VI. to the sternum, two bony and one cartilaginous. The upper part is large, and somewhat triangular in shape, placed with its apex downwards, meeting the second bone of the sternum. The base is upwards, inclined towards the throat, and is smoothly hollowed out behind for the passage of the trachea. On each upper corner it has a large articulating concavity for the ends of the collar-bones to work in ; a little below this is the socket for the short cartilage of the first rib. The cartilage of the second rib is placed in the interstice between the first and second part of the sternum, so that one-half of the socket for the cartilage is formed in the lower half of this bone, and the other half in the upper end of the next.

The second piece of the sternum is
VI. rectangular, long, and flat, and forms the chief length of the bone ; it receives into itself the cartilages of eight ribs, but as three of the lower cartilages are run into one, there are but five sockets or marks on the bone.

These sockets are deep in the firm substance of the bone, and are large enough to contain the point of a finger.

The third piece of the sternum is
VI. called the *ensiform appendage*, or *xiphoid cartilage*. It lengthens the sternum, and gives to the point the general resemblance to a sword that is to be traced in the whole bone, so that its upper end is sometimes called the manubrium, or handle of a sword, the middle part its blade, and the cartilage its point. It is continuous from that part of the bone which receives the seventh cartilage, is continued downwards a short distance, and serves for the attachment of certain muscles of the abdomen.

It may be noted that the whole
VI. thorax is a flexible box, so that in extreme lateral movements the ribs on the side towards which we lean are nearly closed together ; at the same time those on the other side are widely

separated ; it is also the same with movements of the back. The instinctive shrinking from a blow in the ribs tends to close the bones on the side that is threatened.

THE PELVIS.

VIII.—IX. The **Pelvis** is a circle of large strong bones, interposed between the lower extremity and the trunk. It consists of three parts :—The *sacrum*, the *innominate bones*, and the *coccygeal bones*.

VIII. i. ii.— The **Sacrum** is also called the false IX. ii. spine or false vertebræ. It is easy to recognise the shapes of the vertebræ in the mass of bone, in which four such are joined into one ; the processes also can be distinguished. It is of triangular form, with the base turned upwards to receive the spine. Its inner surface is concave and smooth ; its outer surface rough and irregular, giving rise to the great gluteal muscles which give shape to the hip, and to the strong muscles of the back and loins which raise the spine and sustain the body in the upright position. Under its spinous processes there is a cavity or canal which protects the last portion of the spinal marrow, here changed to a mass of coarse nerves, and called the *cauda equina*, from its resemblance to a horse's tail. There are various holes in front and behind for the passage of nerves. The sides of the sacrum are rough, rocky, bony expansions for a firm interlocking joint with the innominate bones.

VIII. i. ii.— The **Coccygeal Bones** are an appendix IX. ii. pendage to the sacrum, and terminate this bone in a point. It is the prolongation of this bone in quadrupeds which forms the tail.

VIII.—IX. i. The **Innominate Bones** are the —X. two great irregular bones which have a form so difficult to explain that the old anatomists called them *ossa innominata*—the nameless bones. But these bones in the child are found to be in three pieces, and they retain their original names, though in the adult they are united into one large bone.

The three parts are called the *ilium*, the *ischium*, and the *pubes*. They join in the centre of the socket for the hip-joint.

VIII. i. ii.— The **Ilium** is the largest part of the X. i. ii. iii. bone ; it is a broadly expanded wing, rising from the pelvis, and forming the flank of the bony basin. It is covered with the great

muscles which move the thigh, and to its edges are fixed the large flat muscles which form the walls of the abdomen. The upper flat VIII. i. ii.— part is called the *ala*, or wing. This X. i. ii. iii. wing rises to a strong triple ridge of bone ; it is called the spine or crest of the ilium, and is the origin of several muscles. The external oblique X. i. is inserted into the outer edge or labrum, and from this margin also the *gluteus medius* arises. The internal oblique X. i. arises from the middle of this ridge, or spine, and the transverse muscle from the inner edge. The two ends of the spine are rough, and the points formed are called X. i. spinous processes. There are two in front and two behind. The two *posterior spinous processes* are rather near together, and are VIII. ii. two rough projections which jut out close to the articulation of the bone with the sacrum ; their chief use is to give firm origin to the ligaments which bind this joint.

The two anterior spinous processes are more important.

The *Anterior Superior Spinous Process* VIII. i. ii.— is the rough ending of the spine in X. i. ii. front ; from it the *sartorius* muscle, the tensor of the sheath of the thigh, and a ligament which goes down to the pubes, take their origin.

The *Anterior Inferior Spinous Process* VIII. i.—X. i. ii. is a small smoother projection or swelling, which gives rise to the *rectus* muscle of the thigh ; inside the process is a depression for the passage of the *iliacus internus* and *psaos magnus* muscles. X. i.

The back or *Dorsum of the Ilium* is covered by the three great gluteal muscles. There is a strong semicircular ridge, which runs from the upper part of the anterior inferior spinous process to the lower part of the notch ; it marks the origin of the *gluteus minimus* ; it has a broad X. i. rough surface by which it is connected with the sacrum. Inside is a sharp line called the *linea innominata* ; it divides the wing from the true pelvis, and separates the cavity of the pelvis from that of the abdomen.

The **Ischium** is under the ilium, VIII. i. ii.— and is the lowest part of the pelvis ; IX. i.—X. i. it is the bone on which we sit. It forms the largest third of the socket, so that this is sometimes called the *acetabulum ischii*.

The rough projection or round swelling on which we sit is called the *tuber ischii*, and the smaller part which extends upwards to meet the pubes is

called the ramus or branch ; it forms a part of the rim of the hole called the obturator foramen, and sometimes the thyroid hole, and also foramen ovale.

The body is the upper and thicker part of the bone which forms the socket ; from the body the

VIII. ii.— *spinous process* of the ischium projects

X. i. ii. backwards, and, pointing towards the sacrum, receives from its lower end the uppermost of two long ligaments, which, from their passing between the ischium and sacrum, are called the sacro-ischiatic ; by this ligament the large notch of the ilium, just below the juncture of the ilium with the sacrum, is made into a large round hole,

VIII. ii. called the sacro-sciatic foramen, which gives passage to the pyramidalis muscle.

VIII.—IX. i. The **Ramus** of the ischium rises obliquely upward and forward to join the similar branch of the pubes ; it contains the enclosure of the thyroid hole.

VIII. i.—IX. The **Pubes**, or share bone, is the i.—X. smallest third of the os innominatum ; it forms the fore part of the pelvis and completes its brim. It, too, consists of *body* and *ramus*. The body is that part which completes the socket of the thigh bone ; it grows forward to meet the corresponding half on the opposite side, and between them fibro-cartilage is interposed. Over the middle of this bone two great muscles pass out from the pelvis to the

VIII. i. thigh. The *ramus* is more slender, and joins the ramus of the ischium ;

VIII. i. with its fellow it forms the arch of the pubes, and completes the thyroid hole.

VIII.—X. ii. There are a few points respecting the pelvis that require attention.

VIII. i. The *acetabulum*, so called from its resemblance to the vinegar cup of the ancients, is the hollow or deep socket for the head of the thigh bone. It is called a bony ring, but at the lower edge a portion of the ring is missing. This is made up by a ligament ; the bony cup is deepened in the recent subject by a rim of cartilage ; this is, of course, lost in the dry skeleton. The *brim* or

VIII. i. *arch* of the pelvis should be noted as the arch by which the weight of the body and upper limbs is transmitted to the thigh bones, and thence to the ground.

THE LOWER EXTREMITY: — BONES OF THE THIGH, LEG, AND FOOT.

The **Femur** or **Thigh Bone** is the largest bone of the body ; it supports the whole weight of the body, and it does this under most unfavourable conditions, for the body is seldom so placed as to rest equally on both thigh bones, and the neck stands off at right angles to the shaft ; it is more usually inclined on one side or the other, and, as this is the case, the weight of the body is usually thrown on to one thigh bone alone, the neck of which bears all the burden.

The *body* is regular and cylindrical, but with a ridge behind attached to it ; it swells out at each end into an expanded head. It is bent forwards, perhaps to relieve the stiffness of a rigid straight bone ; also for the advantage of the strong flexor muscles at the back of the thigh, to give them greater power or more room.

The *head* is two-thirds of a sphere ; it is placed deeply in the socket, which is not only an ample cavity in itself and so far very secure, but is also deepened by a border of cartilage. It is thus a very strong joint, still further strengthened by powerful ligaments. The dimple or depression in the centre of the acetabulum is for the attachment of the round ligament, which at its other extremity is fastened to the head or ball, and there forms a pit or depression.

The *neck* is more than an inch in length, thick, and strong, and set out at a considerable angle to allow the head to be set more deeply in the socket and to keep the movements wide and free. The trochanters, or turners of the thigh, receive the muscles which turn it on its axis ; they are the points of attachment, also, for those muscles which bend and extend the thigh. The larger, called *trochanter major*, is that great hump of bone which is placed at the outer end

of the neck, and which rises above it. On the upper and fore part of this great process are two surfaces for the insertion of the gluteus medius and minimus. There is on its inner side a depression or pit, or notch, into which the smaller rotators of the thigh are inserted ; such are the pyriformis, gemelli, and the two obturators. On its lower margin is a strong ridge for the insertion of the gluteus maximus. The *trochanter minor* is a smaller and more pointed

process on the inner side of the bone under the root of the neck. It is placed somewhat backwards, so that muscles which straighten it point

the toe outwards. It is the point of attachment for certain large muscles which flex the thigh and

X. ii.—XI. bend it towards the body; these are
i. ii. iii. the psoas and iliacus internus, which, passing out from the pelvis, sink deep into the groin, and are implanted into this point of bone. Between the two trochanters observe the *inter-*

XI. *trochantral line*, to which the large capsular ligament is attached as well as the quadratus femoris.

The *Linea Aspera* is a rugged prominence which runs all down the back of the femur; it begins at the base of each trochanter; these come together and pass down the bone as one, until they fork out again, and end with each condyle. The condyles

XI. i. iii. are two tuberosities into which the end of the femur swells. The inner condyle is the larger; it compensates for the obliquity of the thigh bone. Between the two in front is a smooth surface on which the patella glides. The outer edge of this depression is the largest and the most prominent, and serves to keep the patella safely in its place.

XII. The **Tibia** is so named from its resemblance to a pipe, the upper end being the trumpet-shaped mouth, and the lower the mouthpiece. It is flat and broad at its upper end, making a singular joint, for there is no security in the form and disposition of its bones, as they are only laid one on the other. It is, therefore, by means of ligaments that this joint is strong.

The upper end is flat, with a double shallow depression, for the two condyles of the femur to articulate into. Between the two is a ridge; this is received into the space between the condyles of the femur at the back, where the ridge is highest. There is a pit on the fore and back part for the attachment of the crucial ligaments. The whole head of the bone has a rough margin for the attachment of the capsular ligament. In front, below the knee, there is a bump for the insertion of the great ligament of the patella; on the outer side, below the head, is a smooth articulating surface for the attachment of the fibula. This latter bone does not enter into the construction of the knee-joint; it is only laid on at the side of the tibia, and fixed to it by ligaments.

The *body* of the bone is of triangular form; from below the tuberosity a sharp ridge, the shin, passes downwards, but is expanded below into a smooth

XII. iii. surface, to allow the tendon of the tibialis anticus to cross it easily to the inner margin of the ankle. The shin is waved in

curvature, for another ridge, not so sharp, is turned directly backwards; and a third is turned towards the fibula to receive a ligament or interosseous membrane, which ties the bones together. The back surface is hollowed by muscles; so is the outer surface, for the lodgment of the
XII. iii. tibialis anticus and the long extensors.

The lower head of the tibia forms the principal part of the ankle-joint; it is smaller than the upper end, as the ankle is smaller than the knee it forms the bump of the *inner ankle*. The lower end of the fibula forms the *outer ankle*; there is a deep hollow in the tibia to receive this latter bone. The lower end has an excavation which exactly corresponds to the astragalus of the tarsus; it is called the scaphoid cavity.

On the back of the lower head of the
XII. i. tibia is a groove for the tendon of the tibialis posticus muscle.

The tibia is of considerable size, density, and strength, as it has to support the whole weight of the body without the assistance of the fibula. It is strengthened by its ridges and by its triangular form. Observe that the whole bone appears as if it had been twisted; this torsion makes the inner ankle lie not regularly on the side of that joint, but a little forward. The outer ankle recedes in the same degree behind it; this determines the obliquity of the foot. The inner ankle is higher than the outer.

The **Fibula** is a long slender bone; XII. i. ii. iii. it completes the form of the leg and adds to its strength; it gives broader origin for its strong muscles. It is somewhat arched towards the tibia, and supports it against those accidents which might break it across.

It is triangular in section in the middle, but squarish towards the ends; the heads are large and knobby. It has certain sharp lines, or spines, of which the sharpest is turned towards the tibia, with the interosseous membrane be-
XII. iii. tween them. The other lines or spines

indicate the origins of muscles, of which six have their origin on the fibula. They are: 1, the soleus, from the back part of the head; XII. i.

2, the tibialis posticus, from the back
XII. i. iii. and lower part of the bone; 3, the flexor longus pollicis, all down the back
XII. i. part of the bone;

4, the peroneus longus, from nearly the whole length
XII. ii. iii. of the bone; 5, the peroneus brevis, XII. ii. from the middle and lower part;

6, the peroneus tertius, from the fore
XII. iii. part of the bone.

XII. ii. The upper head of the fibula is rough, for the attachment of ligaments for the insertion of the tendon of the biceps femoris.

The knee is wrapped around with the expanded tendons of the great muscles which make up the thigh, the tendons of which, from the outer hamstring, are fixed into the head of the fibula, and expand from that point over the fore part of the tibia.

The lower head of the fibula is let deeply into a groove or notch or socket of the tibia; on the back there is a furrow which guides and lodges the peronei tendons, it forms the outer ankle. This joint is a hinge in which there is no lateral movement, except when the toe is pointed, then the smaller end of the astragalus passes forward to the space occupied by the larger end, where the leg is directly over the foot, and consequently gives some lateral play in the joint.

XII. iv. v. The **Patella** or **Knee-pan** is a small thick bone, heart-shaped; the base is upward, and receives the four muscles which extend the leg. The pointed end is downwards, and is tied by a strong tendon to the bump or tubercle of the tibia, just under the knee. The

XII. iii. convex side is rough, the concave smooth, and divided by a ridge into two unequal parts; round the margin of the bone is a slight depression for the attachment of the capsular ligament. The ligament of the patella is that which connects the bone with the tuberosity of the tibia, it is inelastic, and, therefore, fixes the bone at a constant distance from the tibial tuberosity.

The patella is a lever, for as it projects in front of the line of the thigh and leg, it removes the acting force from the centre of motion, and thus increases the power. It is so contrived that when the knee is bent and the muscles at rest, as in sitting, the patella sinks into the hollow of the knee, *i.e.*, that space of the joint between the con-

XI. dyles of the femur. When the muscles begin to act, the descent of the condyles into this space causes the patella to advance or rise upon the femur, which glides under it. In proportion as the muscles contract, they lose their power, but the rising of the patella increases the power, and thus an even force is applied to the extension of the lower limb. When the contraction of the muscles has fully taken place, the patella is at the summit of the knee, fully thrust forward by the projection of the condyles.

XIII. i. ii. The **Tarsus** or **Instep** is formed of seven bones, which form a firm and

elastic arch. The bones are the *voussoirs* of the arch, but they are joined by ligaments so strong and well knit that it is to them we owe the arched form of the foot; each of these bones moves on that with which it is in contact, and they never grow together.

The seven bones of the tarsus are :
 1, the astragalus, which joins the instep to the leg; 2, the os calcis, or heel bone behind the astragalus; 3, the scaphoid, or navicular bone, which joins the astragalus to the three bones in front; 4, the cuboid, which joins the os calcis to the external wedge bones; 5, 6, and 7 are the cuneiform bones, making up the whole tarsus; they are wedge-shaped, and it is upon their anterior surface and that of the cuboid that the metatarsal bones are implanted. These bones of the tarsus form with the metatarsal bones a double arch, first from the heel to the ball of the great toe—this is the arch of the sole of the foot; and, second, a transverse arch, formed by the cuboid and cuneiform bones. These give perfect elasticity to the foot, and prevent it from suffering bad effects from the shock caused by falls or leaping, and other disturbances which would no doubt break any part less perfectly adapted for its use.

The **Astragalus** is the largest bone of the instep. It has a high arched smooth articulating surface, covered with cartilage; it moves in the scaphoid cavity of the tibio-fibular joint, backwards and forwards, like a simple hinge. Observe that the front end of the articular surface is slightly broader than the back end; thus when the foot is pointed toes downwards, there is a certain amount of lateral movement, because the narrowed end of the surface is now in the broader space of the joint; but when the foot is at right angles to the tibia it fits the joint perfectly, and is then rigid.

It fits into the os calcis behind, and the scaphoid in front. The rounded articular surface has also an internal and an external articulating surface at its sides, for the inner ankle, formed by the tibia, and for the outer ankle, formed by the fibula.

The **Os Calcis** is the large irregular bone of the heel. A rough surface on the highest part of its projection backwards is for the insertion of the tendo Achillis; its surface below is peculiarly roughened, for the attachment of the cartilaginous, ligamentous, and cellular substances on which it

rests. It articulates with the astragalus and with the cuboid. An excavation underneath allows tendons and vessels to pass to the sole of the foot.

XIII. ii.— On the outer surface are grooves for
XIV. ii. the tendons of the peronei muscles. Internally observe a bracket-like tubercle, which supports the lower part of the ball of the astragalus.

XIII. i. ii.— The **Scaphoid** or **Navicular Bone**
XIV. ii. was supposed by the old anatomists to resemble a boat. The concave side looks backwards, and receives the head of the astragalus; the flat side looks forward and receives the three cuneiform bones.

XIII. i. ii.— The *first, second, and third Cunei-*
XIV. ii. **form Bones** resemble wedges, and are laid side by side like the stones of an arch; one, two, and three count from the great toe side, towards the back of the foot. They receive the metatarsal bone of the great toe, and the two next it. The fourth and fifth toes rest against the cuboid.

XIII. i. ii.— The **Cuboid** is so named from its
XIV. ii. shape. It is placed against the third cuneiform bone, and behind it joins the os calcis; its front surface is divided into two depressions for the two metatarsal bones it supports.

XIII. i. ii. On its lower surface is a groove, by which the tendon of the long peroneus is transmitted to the sole of the foot.

XIII. i. ii.— The **Metatarsus** is placed in front
XIV. ii. of the tarsus and extends from it to the toes. The metatarsal bones are five in number, of which that of the great toe is the largest and strongest, the second is longest. The little toe metatarsal bone has a peculiarity, namely, its large head, and the manner in which it projects on the outside of the foot to receive the tendons of
XIII. i. the peroneus brevis and tertius.

They are all flattened bones, especially underneath, where the tendons of the toes lie. They have a ridge on their upper or arched surface; they have broad square heads next the tarsus; they are smaller forwards, and terminate in neat rounded heads, which receive the first bones of the toes by ball and socket joint, thus allowing of free motion and a much greater degree of rotation than we permit ourselves to use, from the cramped and unnatural shape of our boots and shoes. These bones are arched, corresponding with the lateral arch of the tarsus. The size of the metatarsal bone of the great toe causes it to project into the sole of the foot. Into it are inserted the tendon
XIII. ii. of the tibialis anticus, coming from its

upper surface, and that of the peroneus longus from below. XIII. ii.

The **Toes** consist of three distinct XIII. i. ii.— bones, and as these are disposed in XIV. ii. rows, they are named the first, second, and third phalanges or ranks of the toes.

The great toe has but two phalanges, XIII. i. ii.— the others have three. They are XIV. ii. flattened on the lower side, and have a flattened groove for the guidance of the tendon of the last joint of the toe. The articulating surfaces of the first row are deep sockets for the extremities of the metatarsal bones. The other articulations are proper hinge joints. The last row has an expansion of bone which supports the toe nail, and gives that expanded character XIII. i. ii. to the tips of the toes.

Sesamoid Bones are little bones like peas, and are more usually found XIII. ii. about the foot than anywhere else. They are found in the course of tendons, especially at points where they would suffer from friction.

Two are constant on the ball of the XIII. ii.— great toe, and grooves are found on XIV. ii. the under side of the metatarsal bone for their articulation; as they are in the substance of the tendons, they are like the patella, and act by removing the acting force from the centre of motion, by which arrangement the power is increased. They are like the seeds of sesamum, hence their name, and are not restricted to the balls of the great toe and thumb, but are also found under other toes and fingers, sometimes behind the condyles of the knee, and in the peronei tendons which run under the sole of the foot.

THE UPPER EXTREMITY.—BONES OF THE SHOULDER, ARM, AND HAND.

The **Scapula** is a thin triangular XV. bone, which is hung to the sternum by a movable intermediate bone; it is not joined to the trunk, but is parted from it by several layers of muscle, so that it lies flat, and glides upon the trunk. The under side is smooth and concave, fitting the convexity of the ribs. On this under surface are two muscles, by one of which it moves the arm, by the other it is moved over the ribs. The sub-scapularis muscle marks its XV. iv. under surface with many smooth hollows and many risings, which are the marks of the several divisions of this muscle, and not the

impressions of the ribs, as some have supposed.

The upper border of the triangular scapula is also the shortest; it receives the omo-hy-

XV. iv. oideus. The lower border receives no

muscles, because it must glide and move freely, as the scapula turns on one point or axis; but it gives origin to two small round muscles, called, on XV. iii.— account of their shape, teres. The

XVI. i. ii. third long border is called the base.

XV. iii. It receives the rhomboid muscles of

XV. iv. the back, and the serratus of the front of the trunk, and these large muscles turn the scapula on its axis, sometimes raising it, at others depressing it; sometimes drawing it backwards, and sometimes fixing it in its place, as different sets of fibres are put into action.

There are two angles, one the superior, more obtuse, to which the levator anguli

XV. iii. iv. scapulæ is inserted; the inferior angle is acute, and gives origin to

XV. iii. the teres major; its point is smooth, to allow it to pass under the latissimus dorsi muscle.

The *Glenoid*, or articulating cavity of the scapula, is on the apex of the triangle; it is so shallow that it can scarcely be said to receive the humerus, so much as that the head of the humerus is laid on it; it is deepened in the living state by a margin of gristle. There is a

XV. iii. iv. narrower part of the scapula behind this cavity that is called the neck. The upper or outer surface is traversed by a strong

XV. iii. ridge of bone called the *spine* of the scapula. It divides the back of the

bone into two uneven divisions; the spaces are

XV. iii. named infra and supra spinatus; each of them lodges a muscle of the same

XV. iv. name. A third muscle, the sub-scapularis, lies under the shoulder-blade towards the ribs, so that this bone is covered with muscles, which move the humerus in different directions.

XV. iii. The *spine*, it has been mentioned, traverses the whole back of the scapula, and receives the trapezius muscle, that beautiful muscle, which covers the neck and the back like

XV. ii. iii. a tippet or hood; from its lower edge the posterior fibres of the deltoid originate; as it advances, it grows to greater depth from the bone, until it ends in the high point or promontory which overhangs the glenoid cavity, and

XV. iii. iv. is called the *acromion* process; it overhangs, and is turned towards, the shoulder inwards at its point, so that it serves as an outlying work that keeps the shoulder-joint in

its place. There is another security for this joint; it is the *coracoid* process, which arises XV. iii. iv. from the margin of the glenoid cavity,

is hooked directly forwards, and prevents dislocation of the shoulder inwards. This process has three surfaces for the attachment of muscles, namely, pectoralis minor, XV. iv. coraco-brachialis, and short head of biceps.

There is another and great source of safety to the shoulder: it is from the scapula being movable; hence it glides easily over the ribs, and thus eludes shocks which would otherwise disable it.

The **Clavicle**, or collar-bone, is to the scapula as a hinge. It is placed XV. i. ii. at the upper end of the breast-bone. It is an S-shaped bone more or less curved, of round section, except at the sternal end, where it is somewhat square, and at the acromial end, where it is flat. It supports the shoulders, propping them out; without this bone they would fall forwards on the breast. Owing to the distance the shoulders are apart, the hands are able to become antagonists. It is convex towards the front at the sternal end, and concave at the acromial end. At this extremity there is a smooth surface, tipped with cartilage, which articulates with a similar surface on the acromion; there is not much movement between them, as they are firmly knitted together with ligament. This connection is to be noted as the juncture of the scapula with a shaft or axis on which it moves. The sternal end has a triangular articular surface. There is a groove XV. i. underneath the clavicle for the sub-clavius. The upper surface is marked by the attachment of the clavicular portion of the sterno-mastoid muscles, and at its XV. ii. external end is a similar attachment XV. ii. for the trapezius.

The **Humerus**, or arm-bone, is a cylindrical bone. The *head* of the bone is large; it is a portion of a large sphere, so that it is flattish in appearance. The neck is that rough division between the head and shaft into which the capsular ligament is affixed.

The tuberosities of the humerus are large, but of unequal size; one is XVI. i. ii. called the greater and one lesser; a groove lies between them. They are similar to the trochanters of the femur, and receive muscles that move the limb.

In the groove that lies between the tuberosities the long tendon of the XVI. i. biceps runs; it is smooth, and lined with cartilage

On the outside of the groove is a long ridge for the

XVI. i. insertion of the pectoralis major; on

XVI. i. the inside another for the latissimus dorsi; farther down, about a third of its length

from the head, is a roughness for the

XVI. i. attachment of the deltoid muscle. The

humerus changes its round character below, where it is flattened and spread out laterally into two

points of projection, called *condyles*, for

XVI. i. ii. the origins of the two great sets of

muscles; between the condyles there is a grooved articulating surface, which forms the hinge of the elbow. Observe the twisted appearance of the oblique lines of the ridges, especially those at the back of the bone.

There are two ridges supporting the condyles. These ridges give origin to a ligamentous membrane, which divides the flexors of the arm from the extensors, and is an intermuscular membrane. The elbow has simply the movement of a hinge; therefore the muscles moving it backwards and forwards may lie close on each side of the flattened bone. The septum of membrane extends this flattening of the bone. The condyles are projections above the joint, but have nothing to do with it; the outer is less than the inner. The outer

XVI.— gives origin to the extensors, the inner

XVII.— to the flexors, of the wrist and hand.

XVIII.—
XIX. The flexors are the stronger of the two sets; therefore they have a bolder or more prominent origin. The inner tubercle

XVI. i. ii. or condyle is lower than the other, so that the articulating surface is oblique; the effect of this is that when the hand and arm are flexed, they fold towards the face and breast, and, in extension, the forearm marks an obtuse angle with the upper arm.

The articulating surfaces between these condyles are double: first a smooth surface, upon which the ulna moves as a hinge, and secondly a small knob, which has a neat round surface, on which the button-like end of the radius rolls.

Above these surfaces are two pits, called fossæ; the one in front receives the coronoid process of the ulna, and is called fossa coronoidea;

XVI. i. ii.— the one behind receives the olecranon, XVII. ii. iii. and is called fossa olecranal.

The **Radius** and **Ulna** are the two bones of the forearm. The radius is likened to the spoke of a wheel; the ulna is so named from its having been used as a measure. The radius belongs to the wrist, which turns along with it in all its rotatory motions; the ulna belongs to the elbow, for by it

we perform all the motions of bending or extending the arm.

The **Ulna** is generally of triangular XIV. i.— form like the tibia, and the elbow is XVII. ii. iii.

formed by it alone; there is a deep notch, which is called the *greater sigmoid cavity*, from

its fancied resemblance to a Greek XVII. ii.

sigma; it is deepened by two processes, one before, the *coronoid*, and one behind,

the *olecranon*, which is the extreme XVII. ii.

point of the elbow. This large process serves as a lever for the muscles which straighten the forearm; it is also a check on it when it arrives in its place by extreme extension, and the sigmoid notch embraces the humerus so closely that it hooks on to it, and thus prevents the joints from dislocation in violent actions of pulling. The coronoid process in front serves a similar use in the resistance to forces which might displace the elbow, as in striking, pushing, or falling on the hands.

On the outer side of the head of the ulna is a small hollow in which the head of the radius rolls; it is called the *lesser sigmoid cavity*. The

form of the bone is triangular; it has, XVII. ii.

therefore, three ridges, one of which is turned towards a corresponding ridge on the radius, and between the two the interosseous membrane is stretched; this membrane fills the space between the two bones, securing them together, and serving as a membrane of attachment for muscles on both sides of the arm. On the outside of the bone is a triangular surface for the insertion of

the anconeus muscle. The ulna, larger XVII. iii.

at the elbow, decreases in size downwards, until its lower head is formed for the wrist articulation. It is received into the side of the radius, which turns on the lower end of the ulna like a spoke around its axle.

The *styloid process* extends beyond the XVII. iii.

lower head, and is chiefly used as the

point of attachment for a ligament. The ulna is felt under the skin from the olecranon to the styloid process, and is thus useful as a measure of length, and was so used by the ancients; for this reason it is also called the cubitus.

The **Radius** is the second bone of the XIV. i.—

forearm, and is the reverse of the ulna, XVII. i. iv.

inasmuch as it is larger below and smaller above. The greater end is downwards, as it serves as the principal attachment of the wrist, which it carries so completely that it has been called the *manubrium manus*, as if it were the handle of the hand. The radius lies on the outer or thumb margin of the

arm, is triangular, larger than the ulna, and arched away from that bone; one of its ridges faces towards the corresponding ridge of the ulna to receive the interosseous ligament.

XVII. i. iv. The **Upper Head** is a small, round, flattish, button-shaped projection; it lies in contact with the lower end of the humerus, and the outer side of the ulna, the depression in its head being for the former articulation, its circular sides for the latter. Below is the neck, where it narrows; a round ligament, called the coronary ligament, surrounds the bone here, and keeps it secure in its place, as it turns in it as in a socket or ring, for the radius has two motions, the first accompanying the ulna in its movements of flexion and extension, and the second its own peculiar rotation, which is independent of the ulna.

Below the neck is a large bump, like a flat button soldered on to the bone; it is the point into which the most powerful muscle of the arm is inserted—the biceps brachii flexor.

XVII. i. iv. On the outside of the bone, and near the middle, there is a roughness for the insertion of the pronator teres.

XVIII. iv. The **Lower Head** is broad, strong, and flat; it receives the bones of the wrist. There are two larger bones of the wrist called the scaphoid and lunar; these form a large ball, and this is received into the lower end of the radius. The impressions these bones make are pretty deep, and somewhat boat-like in shape, whence it is called (like the articulating surface of the tibia) the scaphoid cavity; it is sometimes divided by a ridge. The edge of the bone near the thumb ends in a point, called the styloid process of the radius. Thus the scaphoid cavity of the radius forms the joint of the wrist.

There is another small cavity in which the lesser head of the ulna works. The little end of the ulna does not descend so low as to have anything to do with forming the wrist. On the outside of the lower head are a ridge and two grooves on the sides of it. The extensor tendons run in them; the extensors of the thumb also make depressions. On the inside of the head of the bone there is a

XVII. i. ii. flattened surface for the lodgment of the pronator quadratus, and a sharp line for its insertion.

XVIII.— The **Carpus**, or wrist, consists of
XIX. eight bones, in two rows of four, arranged thus:

XIV. i.— 1st row (on the thumb side): 1, sca-
XVIII.— phoid; 2, lunar; 3, cuneiform; 4,
XIX pisiform.

2nd row, supporting the metacarpal bones: 1, trapezium; 2, trapezoides; 3, os magnum; 4, unciform.

They are arranged as an arch, in which they lie in their two rows evenly, except one, which is a little removed from its rank.

On the internal surface they are seen on their narrowed ends, crowded and huddled together, but in this hollow the four corner bones are seen projecting towards the palm; from these four projections a strong ligament binds down the tendons and makes a smooth floor for them to glide in; it also protects nerves and vessels from injury.

FIRST ROW.

The *Scaphoid* is the largest, and forms the chief part of the wrist-joint; it is the one that is received into the radius. The process on the palmar surface forms one of the four projections already mentioned.

The *Lunar* joins the scaphoid in forming the wrist, as it articulates with the radius.

The *Cuneiform* is wedged in between the lunar and pisiform bones, and is so named from this circumstance, rather than from its shape.

The *Pisiform* is a small round bone, pea-shaped in form. It is placed upon the cuneiform bone, and stands off towards the palm of the hand, and is the most prominent of the four corner bones of the palm. It is the bone mentioned as being out of its rank. It can be felt opposite the end of the styloid process of the ulna. It has the ligament of the wrist inserted into it, and it receives the tendon of the flexor carpi ulnaris.

SECOND ROW.

The *Trapezium* is a large bone, so named from its shape, which is quite irregular. The socket for the articulation of the thumb, which stands off from the side, is its most remarkable characteristic; there is also a process which makes one of the corner points opposite to the unciform.

The *Trapezoides*, as its name implies, resembles the trapezium, but it is more wedge-shaped.

The *Os Magnum* is not the largest bone of the wrist, but it is the most prominent; it is the centre bone of the

row; it has a round head, which forms a joint with the lunar and scaphoid of the first row.

XIV. i.— The *Unciform*, or hook bone, so

XVIII.— called from the hook-like process which

XIX. projects towards the palm, is the last of the four corner bones.

All these bones are encrusted with cartilage, and are bound together by cross ligaments of great strength, and form almost one joint. They are all more or less wedges, with their broader ends outwards, and their smaller ends towards the palm; they are thus like the stones in an arch, and scarcely any force or violence is sufficient to break them down. If it do prevail, it beats the others in by forcing one of them out.

XVIII.— The **Metacarpus** consists of five

XIX. bones, on which the fingers are founded. They are big strong bones, brought together closely at the roots, and wider apart above, swelling out into round heads so large as to keep them apart; they have round heads for the articulation of the fingers, which join here by a ball and socket joint. Each metacarpal bone is slightly bent, and, being smaller in the middle than at each end, gives

XVIII.— space for the interossei muscles. As a

XIX. whole, they preserve the arched form of the carpus, and thus form the hollow of the hand. Small processes stand out on each side of the heads for the purpose of giving attachment to ligaments. The metacarpal bones have the chief share in the construction of the hand.

The *fingers* have each of them three bones; the thumb two. They are gently

XVIII.— arched, convex on the outer surface, and grooved within for the lodgment of the strong flexor tendons. The bones of the first phalanx articulate with the metacarpal bones by a ball and socket joint.

The second and third rows are gradually smaller; they are strictly limited in their action, having a simple hinge movement. They have strong lateral processes for the ligaments necessary for their security. The last joint or phalanx of each finger is flattened, rough, and drawn gradually smaller towards the point of the finger, and it is to this roughness that the skin and nail of the tip adhere.

The metacarpal bone of the thumb is thicker and shorter than the others. It is differently articulated, being set on the trapezium as a rider sits on a saddle; the trapezium is hollow in one direction, as the saddle is from pommel to crupper, but convex in the other direction. The articular surface of the thumb bone is the reverse of this. It thus rocks in every direction, and the result is a motion as free as if it were performed by a ball and socket joint.

It can thus oppose the fingers firmly, as in grasping; from its superior strength the thumb is called pollex, from pollere.

The other joints and bones are like those of the fingers, differing only in size.

THE MUSCLES.

THE muscles are the proper organs of motion. They possess the peculiar vital property that characterizes them—that of contraction.

They are composed of fibres, and, it has been remarked, are the only proper fibrous textures of the body. They are the active agents, in distinction from the bones and tendons, which are the passive instruments under the influence of the muscles. The muscular fibres are formed into fasciculi, and are variously ordered and arranged for the work that has to be performed.

Muscular fibres are everywhere enveloped in cellular tissue. Towards the end of a muscle the fibres become fewer, and begin successively to terminate: the cellular tissue being thus freed from the interposition of the fibres, its divisions approach, and become more firmly combined so as to form a tendon.

This tendon thus holds relation to each fibre of the muscles, and when these fibres contract, they concentrate their power upon the tendon. The tendons thus are not the continuations of the fibres of the muscle, but of interstitial cellular tissue.

Muscles, of course, are supplied with arteries, veins, lymphatics, and nerves; by the latter their contractions are made subservient to the will, or are carried on regularly, and according to the wants of the part they move.

The muscles accomplish many different purposes. They move fluids through hollow tubes, as the intestines; they envelop, compress, and sustain the viscera, as the abdominal muscles; they lengthen, shorten, or compress some organ, as the tongue: they widen or contract some aperture, as the muscles of the lips; they roll or move, and thus are subservient to the organs of sense, as in the eye and ear; they are inserted or are attached to bones, and thus perform the voluntary motions. It is in this last function alone that we have to study them.

The appearance of the muscles, when the skin is removed, is that of a red mass enclosed in a silvery whitish-grey sheath; this is a bandage of fascia that encloses the whole body and each limb. The fasciæ have divisions from their under surfaces, which sink down between the muscles and divide

them, and to some extent direct their action, and hold them as in a sheath. These fasciæ are strongly knitted and thickened at the joints; they tie down the tendons at these parts, and keep them in position.

MUSCLES OF THE FACE.

The **Occipito Frontalis** is a broad II. i. iii.— thin muscular expansion, which covers XX. i. the whole of the upper part of the cranium. It consists of two bellies, with an intervening sheet of flat thin tendon. The one belly covers the occiput, the other the forehead.

The occipital portion is the fixed point. It arises from the superior transverse ridge of the occipital bone, and from one mastoid process round the back of the head to the other.

The front portion is fixed more into the skin and eyebrows than to the bone. It is slightly inserted in the bone about the inner corner of the eye and root of the nose by a descending slip, but its chief attachment is to the skin of the eyebrows. Its tendon is very thin, slides smoothly on the pericranium, and is firmly adherent to the scalp.

Its use is to raise the eyebrows, and in so doing it wrinkles the forehead and corrugates the whole scalp. It is certainly a muscle of expression. The slip that goes down to the nasal bone, being below the eyebrow, must pull it downwards, thus to some extent serving as an antagonist.

The **Corrugator Supercilii** is a I.—II. iii.— small muscle which lies along the upper XXI. 2. margin of the orbit, under the last. Its origin is from the internal angular process of the frontal bone. There it runs upwards and outwards to its insertion, which is the skin under the eyebrow. Its use is to knit and corrugate the eyebrows.

The **Orbicularis Palpebrarum**, or I.—II. iii.— **Oculi**, is a regular muscle surrounding III. ii.— the eye, and forming part of the sub-XX. 5. stance of the eyelids.

It has a tendon at the inner corner of the eye, which is both its origin and insertion. This tendon causes the little whitish glistening knot that is

felt and seen between the corner of the eye and the nose. The muscular fibres spread out thinly over both lids to the outer corner of the eye; they overlap the orbit below and at its outer margin. It is probable that two sets of fibres, one thinner than the other, perform the quick and almost involuntary movements of the eyelids. The use of the muscle is to close the eye, which it squeezes with spasmodic violence when the eye is injured, as by dust or anything else that irritates it; also, by drawing together the eyelids so firmly, it presses up the ball of the eye into the socket, and excites the lachrymal gland to a flow of tears.

The **Levator Palpebræ Superioris** arises deep within the socket from the margin of the optic hole, and its muscular fibres expand till they cover the whole of the upper lid, finally terminating in the whole length of the gristly margin of the upper lid. Its use is to raise and open the upper eyelid. The lower lid is almost immovable.

MUSCLES OF THE NOSE AND MOUTH.

I.—III. ii.—**The Levator Labii Superioris**
XX. 11.—**Alæque Nasi** is a neat delicate muscle
XXI. 4. which has its origin in a small double tendon, close to the tendon of the orbicularis, on the nasal process of the upper jaw. It is a small bundle of fibres above, but it spreads out broader at the wing of the nose into two fasciculi, one of which is implanted into the wing or cartilage of the nose, and the other, passing this point, goes to the upper lip. It is thus pyramidal in shape. It raises the upper lip, and spreads the nostrils widely as in violent rage, or when there is a great demand on the breathing muscles.

I.—III. ii. v.—**The Levator Labii Superioris**
—XX. 10. **Proprius** arises from the upper jaw
—XXI. 6. just above the incisor or cutting teeth, and just under the lower margin of the orbit. It is broad at its origin, and runs obliquely downwards and inwards till it meets its fellow in the filtrum or depression which passes down the middle line of the upper lip from the partition of the nose to the tip of the lip. It pulls the upper lip and septum of the nose directly upwards.

I.—III. v.—**The Zygomaticus Minor** arises
XX. 9. from the cheek-bone near the orbit, nearer the nose than zygomaticus major. Its fibres

are inserted into the upper lip with those of the last-named muscle.

The **Levator Anguli Oris** is also I.—III. ii.—
called *caninus*; for, as the levator pro- XXI. 7.
prius arises from the jaw above the incisor teeth, this rises from the jaw above the canine or dog teeth. It is mixed up with fibres of the orbicu- XX. 6.—
laris oris, at the corner of the mouth, so XXI. 9.
that it raises the angle of the mouth upwards. These four, viz., levator anguli oris, levator labii superioris alæque nasi, levator labii superioris proprius, and zygomaticus minor, are sometimes called *quadratis labii superioris*.

The **Zygomaticus Major** arises from I.—III. v.—
the cheek-bone over the zygomatic su- XX. 8.
ture; it runs downwards and inwards to the corner of the mouth. It is long and slender, and ends by mixing its fibres with the orbicularis and depressor of the lips. The zygomatic muscles pull the angle of the mouth upwards, as in laughter; the strong action of these muscles is seen in rage and grinning; they cause a line to extend from the cheek-bone to the corner of the mouth. It is said that negroes have three zygomatics.

The **Buccinator** is a large thin I.—III. ii. iii.
flat muscle arising from the pterygo- —XX. 14.
maxillary ligament, and from the —XXI. 10.
alveoli of the upper and lower jaw; it goes forward with direct fibres to be inserted into the corner of the mouth within the orbicularis. It forms the walls of the cheek, and assists in swallowing as it flattens the cheek; by the same action it keeps the food between the grinders as we eat; by its contraction it also expels the wind that is forced from the lungs; it is thus used by players on wind instruments, whence its name of the trumpeter's muscle.

The **Depressor Anguli Oris** (or I.—III. iii.—
Triangularis Menti) is a neat triangular XX. 16.
muscle, from its shape sometimes called *triangularis oris*, or *labiorum*. The base of the triangle is at the line of the lower jaw, where it is an inch in breadth, and fleshy. It grows smaller as it passes upwards to the corner of the mouth, where it is implanted opposite the zygomatic and levator muscles. This muscle makes a line from the chin to the corner of the mouth. It is chiefly active in expression, and gives character and form to the chin and mouth. In angry and depressing passions the *triangulares* pull the corners of the mouth downwards. The richness of form at the corners of the mouth is caused by the meeting of many muscles there.

I.—III. iii.— The **Depressor Labii Inferioris** is a
 XX. 17.— small muscle lying on each side of the
 XXI. 11. chin; it arises from the lower jaw under-
 neath the last-named muscle. It grows obliquely up-
 wards and inwards, till it meets its fellow in the
 middle of the lip, where the two make a filtrum or
 furrow on the lower lip. It mixes its fibres with
 the orbicularis. Its office is to pull the lip down-
 wards. Each muscle is somewhat square, hence it
 has been called *quadratus genæ*, or *menti*.

XX. 6.— The **Orbicularis Oris** is the round
 XXI. 9. muscle which forms the chief mass of
 the lips. It surrounds the mouth; its fixed points,
 if it has any, are the corners of the mouth; a part
 of it also is traced to the alveolar process of the
 canine tooth. It contracts the opening of the lips,
 and antagonizes the muscles above mentioned,
 which converge into it, and pull it apart in various
 directions. A slip often runs from the middle of
 the lip to the septum and tip of the nose; it lies in
 the filtrum, and acts doubly as elevator of the lip
 or as depressor of the nose.

The muscles of the nose and lips are not only
 useful in expressing the passions; their great office
 is to perform those continual movements which
 breathing, speaking, chewing, and swallowing re-
 quire. There are muscles for opening the mouth
 in all directions, which are all antagonized by this
 XX. 6; XXI. one, the orbicularis oris. The levator
 9.
 XX. 10.— labii superioris and the depressor labii
 XXI. 6. inferioris separate the lips and open the
 I.—III. iii. mouth. The levator anguli oris, with
 XXI. 7. the zygomatic muscles, raise the cheek
 XX. 8, 9. and dilate the corners of the month.
 XX. 14.— The buccinator pulls the corners of the
 XXI. 10. mouth directly backwards, opening the
 XX. 16. month. The triangularis oris also
 dilates the mouth, pulls its angles downwards and
 backwards, and forms the opening into a circle if
 the others act with it at the same time; but the
 XX. 6.— orbicularis is the largest and strongest
 XXI. 9. of all these (formed, as it were, by all
 these together, by their taking a new direction and
 turning round the lips), shuts the mouth, and
 antagonizes them all, and, from the widest opening
 the mouth can make, shuts it so closely as to retain
 the breath against the full force of the lungs.

There are also some smaller muscles which must
 be named.

The **Depressor Labii Superioris** arises from
 the gum or socket of the front teeth, goes to the
 root of the nostril, and pulls it and the upper lip
 down.

The **Constrictor Alæ Nasi** crosses the wing of
 the nose, and goes to the point for insertion; it
 meets its fellow in the middle ridge of the carti-
 lage.

The **Levator Menti** or **Superbus** I.—III. iii.—
 arises from the root of the incisors of XX. 18.—
 the lower jaw; it is inserted into the XXI. 12.
 skin in the centre of the chin; by its contraction
 it draws the centre of the chin into a dimple, and
 by its moving the lower lip at the same time, it is
 called also *levator labii inferioris*.

MUSCLES OF THE EAR.

There are certain muscles drawn in plates which
 are doubtless often present, but of which the
 majority of civilized men, at least, are the uncon-
 scious possessors. They are those which raise the
 ear, draw it forward and draw it backward. They
 lie under the skin, arise from the fasciæ of the
 temporalis or occipito frontalis, and are inserted at
 the top, front, and posterior portions of the shell
 of the ear. They are called *attollens aurem*,
attrahens aurem, and *retrahens* II. iv.—XX.
aurem. 29, 30, 31.

And there are still other small muscles, not even
 moving the ear, but which put the cartilages into
 tension, and thus prepare them for the better con-
 veyance of sound to the tubes of the ear. They
 are without influence on the external form, and are
 variously named from the different cartilages on
 which they are placed.

So with the eyeball. There are four recti
 muscles, superior, inferior, internus, and externus;
 they simply move the eyeball in the directions their
 names indicate. There are two other muscles, the
 obliquus superior and obliquus inferior. They are
 interesting, but not necessarily a part of the artist's
 study.

MUSCLES OF THE LOWER JAW.

The lower jaw requires muscles of great power
 to grind the food; it is accordingly furnished with
 three strong muscles which pull it upwards.

There are certain muscles which are so placed
 that they have a double office—that of lifting the
 throat and pulling down the lower jaw; but it is
 difficult to say that there are any muscles especially
 for this use; the jaw drops of its own weight.

I.—II. ii. iii. The **Temporal Muscle** is the great muscle of the jaw. It arises from the iv.—III. i. flat side of the temporal, sphenoid, XXI. 1. parietal, and frontal bones, in that hollow behind the angle of the eye where they meet to form the squamous suture. Its fibres are gathered together and packed in small compass, so that they pass under the zygoma. There they take a fresh departure from a new attachment.

The muscle is fan-shaped, its rays converging towards the zygoma. Its muscular fibres are mixed with tendinous ones, especially where it passes the arch. It is protected by a plate of tendinous fascia, which covers the temple. Its insertion is into the coronoid process of the lower jaw, not merely to the tip of the bone, but all around it, and down the whole length of the process, so as to take the firmest hold.

I.—II. iv.— III. i. iii. v. The **Masseter** is a short thick muscle which gives the rounding to the —XX. 7. angle of the jaw. It arises from the upper jaw-bone under the cheek-bone, and the lower edge of the zygoma. It lies on the outside of the coronoid process, covering the ramus of the lower jaw quite to its angle. It consists of two portions which cross each other obliquely, the inner set being a little posterior to the outer, and seen above at the back of that set of fibres. The action of the muscle is probably not simply that of closing the mouth, but may also produce a grinding movement of the jaws. By both acting together, the jaw is firmly pulled up, and when we bite we may see and feel the temporal muscle swelling up over the temple, and the masseter on the outer and back part of the cheek.

III. iv. The **Pterygoid** muscles act on the jaw from within like an internal masseter fixed on the inside of the angle. All together these muscles pull strongly upwards in biting, holding, or tearing with the teeth. The external pterygoid pulls it from side to side, as in the lateral action of grinding.

I.—III. iii.— XX. 20, 21. The **Platysma Myoides**, a thin muscular expansion on the fore-part of the neck, is spread over the other muscles of the neck and throat; it extends upwards on to the lower part of the face. It arises by scattered fibres XX. 21, 22, which are attached to the cellular 23.—XXI. tissue of the pectoral, mastoid, and 17, 26, 27. deltoid muscles; it extends upwards over the clavicle and muscle, passing like a thin integument over the neck; it terminates on the

face and jaw. Some fibres pass as far on to the face as the depressor anguli oris. These are called the **Risorius** or smiling XX. 16. muscle. It is, no doubt, a muscle of expression, but its real use is to take the office of a fascia, and to compress the vessels of the neck and the trachea, which require support, but yet demand perfect freedom of motion.

The **Sterno** (or **Sterno-cleido**) II. i. iv.— **Mastoideus** is a beautiful muscle, and XV. ii.— one that is always visible and most XX. 22.— important to be closely observed by XXI. 19. the artist; it gives the fleshy roundness to the neck, and, when in action, produces the most beautiful contours of the neck, both in man and woman. Its origin and insertion are shortly described in its name *sterno-cleido mastoideus*. It arises from the triangular portion of the sternum by a strong round tendon, and from the sternal portion of the clavicle by a broader and more fleshy origin. These are loosely attached to each other, and are separable all the way to its attachment at the mastoid portion of the temporal bone; it also extends backwards on to the mastoid angle of that bone; an outer slip, called *cleido-occipitalis*, is sometimes found.

When the muscles of both sides pull together, they pull the head down with the chin to the breast. When one acts, it turns the head towards the side of the opposite muscle, because it brings the ear forward towards the sternum.

The muscles of the throat and tongue are not of extreme importance to artists; yet as much of the refined drawing of a neck can only be obtained by a right understanding of the anatomy of this part, it becomes necessary to give a sketch of its construction.

The **Hyoid Bone** resembles the lower jaw in shape; it may be felt at III. vi. the top of the throat, where it turns forwards to the chin; it is about an inch below the tip of the chin. It has a base, and two horn-like processes, which go backwards along the sides of the throat; these are the cornua, tied by ligaments to the styloid process of the temporal bone. It has also smaller projections called the lesser III. vi. cornua.

This bone is the basis of the tongue; it forms also a part of the larynx, which is a collection of cartilages, forming the top pipe of the trachea or windpipe; and it carries upon it that cartilage called the epiglottis, which acts as a III. vi. valve, and prevents anything solid from getting down the windpipe. Its horns extend

alone the sides of the throat, keeping the openings of the windpipe and gullet extended, as a bag might be kept extended by the two fingers.

The chief muscles of the tongue and of the windpipe arise from its body; the chief muscles of the gullet arise from its horns. It receives the principal muscles which raise or depress the throat; it is, in short, the fixed point, or fulcrum, for all the muscles of the throat and tongue, and the centre of all their motions. It is the centre of the motions of the tongue, for it is the origin of those muscles which compose the bulk of the tongue; of the motions of the trachea or windpipe, for it forms at once the top of the windpipe and the root of the tongue, and joins them together; of the motions of the pharynx or gullet, for its horns surround the upper part of the gullet, and join it to the windpipe; and it forms the centre for all the motions of the throat in general, for muscles come down from the chin to the hyoid bone to move the whole throat upwards; others come up from the sternum to move the throat downwards; others come obliquely from the scapula to move the throat backwards, while the hyoid still continues the centre of all these motions.

The **Trachea** or **Windpipe** is that tube which conveys the air to the lungs, and the larynx is the head of that tube; it contains the organs of voice, and it consists of cartilages, that it may stand firm and uncompressed either by the passage of the food or by the weight of the surrounding air, and that it may resist the contraction of the surrounding parts. Its cartilages are the *thyroid*,

III. vi. which, like two valves, meet in the middle line of the throat. This makes a prominent

ridge and bump called the *Pomum Adami*, or Adam's Apple. The flat parts of the larynx are the sides of the thyroid cartilage. There are two long horns at its two upper corners, which rise like hooks above the line of the cartilage, and are joined to the horns of the hyoid bone. Two similar but shorter hooks below

III. vi. embrace the *cricoid cartilage*, which is a ring suspended from the last named, shallower before than behind. It is the top ring of the trachea.

The profile of the throat is mainly influenced by the above parts, but some muscles require passing notice to complete this general sketch of the throat.

The muscles that pull the throat down, and which are sometimes visible in the external form, are:

The **Sterno-Hyoideus**, passing as a XV. i.—VI. flat thin muscle from the sternum, i.—XXI. 18. clavicle, and first rib, upwards, to the lower edge of the hyoid bone.

The **Sterno-Thyroideus** is similar VI. i. vi. to the last, but as the thyroid cartilage is below the hyoid bone, this muscle must lie under the last-named muscle. It covers the thyroid gland, which gives a soft filling to the lower part of the trachea, where it disappears behind the sternum and the advancing mastoid muscles

The **Omo-Hyoideus** is a long XV. iv.—slender muscle reaching from the XXI. 17, 28. shoulder to the bone of the throat. It arises from the upper edge of the scapula, near the notch, and from the ligament that crosses the notch, and is inserted into the side of the hyoid, where the horn goes off from the body of the bone. Its middle part is pinched in and fastened down by fascia, by reason of which it changes its direction, and turns suddenly at an angle upwards towards the hyoid bone. It has on this account been called a digastric muscle. It is seen, first, at the side of the trachea, and secondly between the mastoideus and trapezius; its change of direction has taken place when it is hidden behind the former muscle.

These muscles pull the throat down.

Then come the **Mylo-Hyoideus**, III. iv.—XXI. 14. arising from the whole inner semicircle of the lower jaw, and joined to the hyoid bone; it, with the *genio-hyoideus*, moves the bone forwards and upwards when the jaw is III. iv. fixed, and by the muscles from the sternum they may pull down the jaw.

The **Stylo-Hyoideus** is one of three II. iv.—XXI. beautiful and slender muscles which 15A. come from the styloid process; they begin and end in slender round tendons with a fleshy belly between. This one arises from the middle of the styloid, goes obliquely downwards and forwards, and is fixed into the side of the hyoid bone. Above its insertion its fibres split to allow the tendon of the digastricus to pass through it as through a loop.

The **Digastricus** is named from II. iv.—having two bellies; one arises from a III. iv.—ragged notch along the root of the mas- XXI. 13.—XXIX. 18. toid process; it goes obliquely down and forwards, forming a slender tendon, which passes through the last named muscle, and is then fixed by a tendinous bridle to the hyoid bone; it then turns upwards at an angle, continues as a second

XXI. 14. belly lying above the mylo-hyoideus, and is inserted into the rough portion of the lower jaw. It pulls the hyoid bone upwards; but when the hyoid is fixed by its sternal and scapular muscles, it pulls the jaw down.

These muscles are often visible, and can be felt behind the angle of the lower jaw. They fill the space between the mastoideus and the hyoid bones.

MUSCLES OF THE SCAPULA.

The great peculiarity of the arm is the manner of its connection with the breast-bone, XV. iv. to which it is fixed by the slight ligaments of the clavicle only; but its union with the body is secured by strong and numerous muscles, by which it may be said to be both fixed and moved.

These muscles are here placed first in order before those of the spine and body, because they cover almost the whole trunk, and hide those which move the ribs and spine.

The muscles which move the scapula lie on the trunk; those which move the arm lie on the scapula; those which move the fore-arm lie on the arm; and those for moving the hand and fingers lie on the fore-arm. The arm requires easy and circular motion; it has the wrist turning round, the elbow for hinge-like motions, the shoulder-joint, on which the arm rolls, and to assist these it has the scapula, which is the centre of all these movements, and is itself movable. After a certain point of elevation all the motion in raising the arm is performed, not by the motions of the shoulder-bone on the scapula, but by those of the scapula on the trunk. For when the shoulder-bone rises to the horizontal position, it is checked by the acromion which overhangs it, and if the arm be raised higher still the scapula must roll. In fact, it turns on itself, propped out by the point of the clavicle, and in turning glides upon those muscles which are like a cushion between it and the trunk.

The muscles that move the scapula come from the breast to move it forwards, from the neck to move it upwards, from the spines of the vertebræ to move it backwards, and from the side, *i.e.*, the ribs, to move it downwards.

II. i.—IV.—
XV. ii. iii.—
XXXII. —
XXXIII. The **Trapezius** is named from its geometric form. It resembles a hood hanging down the back; it extends from the nape of the neck to the loins,

and from one shoulder tip to the other. It arises from the most pointed part of the occipital bone, and by a thin tendon along its transverse spine quite to the mastoid process. All down the neck it has no hold on the vertebræ, but arises from its opposite fellow in a strong tendon, which extends down the neck and does not touch the spines of the vertebræ till it comes to the top of the back; this tendon is called the *ligamentum nuchæ*, and is fixed to the spines of the last two vertebræ of the neck. The muscle further arises from all the spinous processes of the back. From this long origin its fibres converge to the tips of the shoulders. It is attached to more than a third of the clavicle nearest the shoulder, and to the whole length of the spine of the scapula from the tip of the acromion.

This extended origin and large insertion must produce different results as to its action, and we see that those fibres which come down must raise the scapula; those which come from the middle of the back must pull it directly backwards; those which come from the lower part of the back must depress it; and all acting in succession must make the scapula roll. It is also a muscle of the head, pulling it backwards and bending the neck.

The **Levator Anguli Scapulæ** is a small strip which rises from the transverse processes of the three, or four, or five uppermost vertebræ of the neck, and are inserted into the upper corner of the scapula between the end of the spine and the angle. It pulls the corner upwards, as in shrugging the shoulders, whence it is named *musculus palænticæ*.

The **Rhomboid Muscles**, major and minor, form a square muscle stretching between the spine and the whole of the base of the scapula. The upper portion, called *rhomboides minor*, arises from the lower spinous process of the neck and the first dorsal, its fibres being closely connected with those of the trapezius. It is inserted into that portion of the base of the scapula which corresponds with the triangular surface from which the spine commences. The portion called *rhomboides major* arises from the spinous processes of the upper four or five vertebræ of the back, and are inserted into the base of the scapula from the spine downwards. It is used to assist certain fibres of the trapezius and levator to raise the scapula, or to carry it backwards.

VII. — XV. The **Serratus Magnus** lies on the side of the thorax, and arises from the 5. — XXIX. ribs. The ribs have interstices between 11. them; every muscle that comes from them arises by distinct portions from each rib; all such heads or slips are called digitations or serræ, from their resemblance to the teeth of a saw. Every muscle arising from the ribs must be a serrated muscle.

It is a broad fleshy muscle, which lies under the scapula, so that nothing of it is seen but its fleshy tongues or heads, by which it arises from the ribs. It arises from all the true ribs, sometimes missing the first, and from three of the false ribs. The upper indigitations lie under the pectoralis major, the middle ones on the side of the thorax, the lower ones alternate with the similar heads of the external oblique muscle; it is part of the cushion on which the scapula glides. Its fibres converge to the base of the scapula, where they are inserted in a thick fleshy mass; it is, as it were, folded round the edge of the bone.

This muscle pulls the scapula forwards and downwards. When the lower portions only act, it pulls the lower corner of the scapula forwards; the scapula thus rolls, and the tip of the shoulder is raised. When the upper portion acts with the small pectoral muscle, it pulls the tip of the shoulder towards the chest, and the lower corner rolls backwards. It is also a muscle much relied on in strong respiratory efforts.

VI. ii. — XV. The **Pectoralis Minor** lies under the larger muscles of the same name, close 4. — XXIII. to the ribs. It arises from the third, ii. iii. — fourth, and fifth ribs (or the second, XXIV. i. — third, and fourth, and sometimes only XXXI. 1. — the third and fourth); its three digitations are thick and fleshy, and converge to the apex of the coracoid process. By its action of pulling the coracoid process forwards, it will roll the shoulder. Although this little muscle is not seen on the surface, it has an important influence on the form of the pectoral muscle which covers it. It is sometimes to be observed outside the border of the pectoralis major, when the arm is raised, and the borders of the armpit are opened to view.

VI. ii. — XV. i. — The **Subclavius** is another concealed muscle of the scapula. It arises XXXI. 4. from a single point on the first rib, and passes flat and fleshy, to be inserted into a considerable length of the clavicle, from a point a couple of inches from the sternum to the end of the bone,

where it is joined by the acromion process. Its use is to pull the shoulder down and so to fix it

The scapula is thus moved in every direction.

MUSCLES OF THE ARM.

The **Pectoralis Major** is the large VI. ii. — XV. thick fleshy muscle which covers all ii. — XVI. the breast. It arises from the half of — XXII. 3. the clavicle next the sternum, from all — XXIX. 5. the edge of the sternum, and from the — XXX. 1. — cartilages of all the true ribs except XXXI. 17. — XXXII. 10. the first and last. It is mixed up with fibres from the external oblique. From this large origin the fibres converge towards the tendon of insertion. They are inserted into the outer margin of the bicipital groove of the humerus. The tendon of insertion is folded on itself, so that the lower fibres of the muscle form the upper edge of the tendon. It pulls the arm inwards towards the side; also forwards, as when the arms cross the breast.

The **Latissimus Dorsi** is the IV. — VII. — broadest muscle, as its name implies; X. i. — XVI. not only of the back, but of the whole i. — XXII. 6. body. It arises by a broad, flat, — XXIX. 11. shiny tendon which covers the loins, — XXX. 13. and is in some degree the root of — XXXI. 15. — XXXII. 15. many other muscles, especially of the 5. — XXXIII.

longissimus dorsi. This tendon begins in the middle of the back; it arises from the spines and knobs of the back of the sacrum, and from the back part of the crest of the ilium, this portion being fleshy. The muscle gradually becomes flat and regular, wraps around the side of the body, and passes over the lower corner of the scapula. Its fibres converge, the upper one going directly across; the lower ones ascend, and they meet in a flat tendon, and cross each other like the pectoral muscle. Thus the upper edge of the muscle forms the lower part of the tendon. It is implanted into the humerus at the inner edge of the bicipital groove; so this tendon and that of the pectoralis meet face to face, where they form a kind of sheath for the long tendon of the biceps to run on.

These two muscles form the borders of the axilla or armpit; the pectoralis lays the arms across the breast, as in carrying loads in the arms, and forms the front border of the armpit. The latissimus brings the arm down, as in striking with a hammer, or even as when striking with the elbow; it also turns the arm, as in turning the

palm of the hand behind the back. The edges of these two muscles bear the weight of the body when we walk on crutches; when they both act, the arm is pressed directly downwards, as in rising from our seat, or in holding a bundle under the arm, or in raising the weight of the body, as in climbing.

XV. ii. iii. — The **Deltoid** is the first muscle XVI. i. — which arises from the scapula to be XXIII. 1. — inserted into the arm-bone. Its shape XXXII. 5. is triangular in profile, and in full view like a Greek delta. It arises from that part of the clavicle that is not occupied with the pectoralis, and is separated from it by a space filled with fat. Another bundle of fibres arises from the point of the acromion process. A third bundle arises from the spine of the scapula behind the acromion. These three heads meet about one-third down the humerus, in a short tendon which almost surrounds the arm-bone. When the arm is lying close to the side, the anterior and posterior heads assist the pectoral and latissimus, in keeping it in its place; but when the middle bundle raises the arm, the side portions, having come into new directions, begin to help; when the arm is raised to a certain point, and more power is required, the clavicular portion of the pectoral muscle also assists. The fore and back bundles also rotate the arm.

XV. iv. — The **Coraco-brachialis** is a slender XVI. i. — muscle arising from the coracoid pro- XXII. 12. — cess of the scapula with the short head XXIII. i. 2, of the biceps; it accompanies this head XXIV. i. 11, during its whole course, and is inserted ii. 1. into the humerus half-way down between the brachialis and the third head of the triceps. It raises the arm obliquely, and also pulls it to the side.

XV. iii. — The **Supra Spinatus** occupies the XVI. i. — hollow of the scapula above its spine. XXIV. iii. A. — XXXIV. It arises from the back of this bone in 6. the limits indicated, and is enclosed by a strong fascia. It passes on under the acromion, past the joint, and is inserted into the head of the great tubercle of the humerus. It raises the humerus directly upwards, exactly at the middle lobe of the deltoid, which it assists.

XV. iii. — The **Infra Spinatus** arises from XVI. ii. — the whole of the triangular surface of XXXII. 12. the back of the scapula, below the — XXXIII. spine, except that portion occupied by XXXIV. 7. the teres, and from the spine itself. XXIV. iii. 2. It also is enclosed in a tendinous ex-

pansion. It continues as a fleshy muscle over the joint, is inserted into the middle of the same tuberosity as the supra spinatus, and has exactly the same uses.

The **Teres Minor** is the third muscle XV. iii. — of this set. It arises from the angle XVI. ii. — and lower edge of the scapula; it XXXII. 13. — XXXIII. also passes the joint, to be inserted 12. — into the large tuberosity of the XXXIV. 8. humerus. All three raise the arm; this in addition rotates it outwards.

The **Teres Major** arises from the XV. iii. — angle and edge of the scapula, lower XVI. i. — down it than the teres minor; it passes XXII. 8. — XXX. 14. — under the long head of the triceps, and XXXII. 14. — under the humerus, turns round it, and — XXXIII. 13. — is inserted into a ridge on the inner XXXIV. 9. side of the bicipital groove close to the latissimus; its use is the same as that muscle.

The **Subscapularis** lines the scapula XV. iv. — and arises from the whole of its inner XVI. i. — surface, which is covered with little XXXIII. iii. 4. ridges and cavities to favour the adhesion of this muscle. It passes round the humerus to its insertion in the lesser tuberosity of that bone; therefore it pulls the arm back and down, and performs the same rotation as the teres major and latissimus.

These muscles, which so closely surround the joint of the shoulder, no doubt tend to strengthen and support it by their flat tendons; each, too, has an attachment to the loose capsular ligament, and pulls it out of the way of the bones as they approach each other in quick actions of the arm.

The muscles of the fore-arm are four in number, two flexors and two extensors.

The **Biceps Brachii Flexor**, as its XXII. 1. — full name runs, has two distinct heads. XXIII. i. 6; The larger head arises from the coracoid ii. 3, 4, 5; process by a long tendon. The second, iii. 3, 3A. — XXIV. i. 12, or long head, arises from the edge of 15; ii. 5. — XXVI. iv. the glenoid cavity, by a long tendon, 23. — XXIX. which lies in its proper groove. The 10. two heads meet about a third of the way down the humerus. It passes down to a large flat tendon which is fixed to that tubercle of the radius which is seen below its neck; but it gives off an aponeurotic expansion on the inner side, which covers all the fore-arm below and encloses its muscles in a sheath. It bends the fore-arm with great strength, but, as it is inserted into the tubercle of the radius, when the hand is turned downwards it will pull it upwards, and so act as a supinator.

XVI. i. — The **Brachialis Anticus** lies under XVII. i. — the biceps. It is called brachialis, from XXIII. i. 7, its origin in the arm, and sometimes 8; ii. 7A; internus, from its being within the XXIV. i. 14; biceps. It arises by a forked head on ii. 2; iii. 6, 8, 10. — XXV. each side of the deltoid, is attached to i. 2, ii. 1, 2. — the bone almost down the joint, and XXVI. iv. 25. — XXIX. 9. is inserted by a thick tendon to the — XXXII. 7. coronoid process of the ulna. It bends the fore-arm. It is seen projecting on each side of the biceps, and gives great thickness to the arm.

XV. iv. — The **Triceps Extensor Cubiti** XVI. ii. — arises from three heads, as its name XVII. ii. — implies. The longest is in the middle, XXII. 11. — and arises from a flat tendon from 9, 10, 13; ii. the edge of the glenoid cavity of the 3; iii. 1, 5, 7, 9. — XXV. i. scapula, under the neck (and near the 1. — XXVI. long head of the biceps); it is under iv. 27. — XXIX. 8. — this head that the tendon of the teres XXXII. 8, 9. major passes to its insertion.

The second head is on the outside of the arm; it arises from the bone below the tuberosity, and just below the insertion of the teres minor. The long and second, or external heads, meet about the middle of the humerus. The third or internal head is the shortest; it arises from all the way down the humerus, from below the insertion of the teres major, and joins the others about the middle of the muscle. All these heads adhere to the humerus to within an inch of the joint; then a strong tendon is formed, which is inserted into the projecting process of the ulna, called the olecranon; by this projection the muscle has great power in extending the arm; the long head may assist to bend the humerus outwards and backwards.

XVI. ii. — The **Anconeus** is a small triangular XVII. ii. — muscle placed on the back of the elbow. XXV. i. 7. It arises from the ridge and external

condyle of the humerus by a short strong tendon, and is inserted by oblique fleshy fibres to the outer part of the ridge of the ulna. It extends the forearm.

MUSCLES OF THE FORE-ARM, WRIST, AND FINGERS.

The muscles of the fore-arm turn the hand, bend the wrist, and bend the fingers.

The turning of the hand is called pronation and supination. When the palm is turned downwards, it is prone; when upwards, it is supine. The muscles which perform the movements are called *pronators* and *supinators*. Now, all muscles that are

inserted into the radius turn it round or roll it; therefore all its muscles are pronators or supinators. The wrist is called the *carpus*; therefore those muscles which bend or extend the wrist are called *flexors* or *extensors* of the carpus.

All the muscles arise from two points XVI. i. ii. (roughly speaking), the external and internal condyle.

The internal condyle is the longer one, and gives origin to the muscles employed in grasping, bending, or turning the hand inwards; therefore, all the muscles which bend the hand or fingers, and the principal pronator, arise from the inner condyle.

The external condyle is shorter; it gives origin to the muscles which extend the fingers or roll the hand outwards. These all arise from the outer condyle.

If it be granted that the biceps is a supinator, and the mass of flexors is a pronator, then these so-called difficult muscles may be easily remembered, as they group themselves in threes, thus—
For the wrist:

3 flexors: ulnaris, radialis, and palmaris.

3 extensors: ulnaris, radialis longior, and radialis brevior.

3 pronators: teres, quadratus, and the mass of flexors.

3 supinators: longus, brevis, and biceps.

For the fingers and thumb:—

3 extensors of the fingers: communis, indicis, and minimi digiti.

3 extensors of the thumb: metacarpi, primus, and secundus.

3 flexors of the fingers and thumb: sublimis, profundus, and longus pollicis.

MUSCLES INSERTED INTO THE RADIUS.

The **Supinator Radii Longus** XIV. i. — arises from the lower fourth of the XVI. i. — humerus, above the outer condyle; it XVII. i. — lies on the edge of the fore-arm, and XXIII. i. 11; ii. 8. — between the flexor and extensor radi- XXV. i. 3. — alis; it is thick as it passes the elbow- XXVI. iv. 1. — joint, but from the middle of the radius it is a thin tendon which is inserted into the outer side of the radius at its lower head. It is not only a supinator, but a flexor also.

The **Supinator Radii Brevis** is a XVII. i. ii. — deep muscle of great power. It arises iii. 9. — from the outer condyle, the edge of the ulna, and from the interosseous ligament: it is then lapped

over the radius and inserted into its ridge, almost meeting its antagonist, the pronator teres. It turns the radius outwards.

XVI. i.— The **Pronator Radii Teres** arises **XVII. ii. iv.** from the inner condyle, and has a **—XXIV. i.** 16.—**XXVI.** second origin from the coronoid process **iii. 10; iv. 9.** of the ulna. It stretches obliquely across the fore-arm, passing over the other muscles to be inserted into the radius at its outer ridge half-way down. It turns the hand downwards; it may also bend the fore-arm on the humerus in strong actions.

XVII. i.— The **Pronator Quadratus** lies on **XXVI. i. ii. iii.** the interosseous ligament, a couple of **8.—XXVIII.** inches above the wrist; its fibres cross **ii. 16.**

between the radius and ulna in a square web. It arises from the ulna, and is inserted into the edge of the radius, and of course pulls the radius towards the ulna. (This and the flexor pollicis are the two muscles which do not come fairly under the plan by which the muscles have been grouped in threes.)

MUSCLES INSERTED INTO THE WRIST AND HAND.

XVI. i.— The **Palmaris Longus**, or flexor **XXVI. iv. 14.** carpi medius, arises from the inner condyle, has a short belly and a long tendon, and is inserted to the fascia, covering the palm and annular ligament near the ball of the thumb. This palmar fascia covers the palm, is triangular in shape, and is expanded by fan-shaped fibres over the ends of the metacarpal bones; at the end are cross rays that bind the others strongly together. It sends down perpendicular divisions to each edge of the metacarpal bones; thus there are eight tunnels or canals for the tendons of the fingers and for the lumbricales muscles.

The **Palmaris Brevis** is a subcutaneous muscle which arises from the edge of the palmar aponeurosis, and sends its small fibres to be inserted into the pisiform bone and the skin and fat on the ulnar edge of the palm.

This is called in old books the guinea muscle of physicians.

XIX.— The **Flexor Carpi Radialis** is one **XXVI. iv. 12.** of the muscles which arises with four **—XXVIII.** others from the inner condyle by a common tendon. It passes downwards in the course of the radius, and forms a long tendon, which runs under the annular ligament to be in-

serted into the metacarpal bone of the fore-finger. Its use is to bend the wrist on the radius; but, like other flexor muscles which lie obliquely, it must also have some power of pronation. The others are palmaris, flex. ulnaris, flex. digit. sublimis, flex. digit. profundus. They also arise from the intermuscular septa of the fascia of the arm.

The **Flexor Carpi Ulnaris** is like **XVI. i.—** the last, but it runs in the course of **XVII. iii.** the ulna; it arises by the common **—XIX.** tendon, and has a second head from **XXV. i. 11;** the olecranon; also from the ulna itself, from two-thirds of its length. Its tendon is inserted into the pisiform bone, where it sends off a tendinous expansion to cover the muscles of the little finger at the annular ligament. It balances the action of the flex. radialis; acting together, they bend the wrist strongly; with the extensor or ulnaris, they pull the edge of the hand sideways.

The **Flexor Digitorum Sublimis** **XVI. i.—** is so named from being the more super- **XVII. ii.** ficial of two; it is also called *perforatus*, **—XIX.** from its tendon being pierced by that **XXVI. ii. iii.** 2; **iv. 18.—** of the muscle below it. It is divided **XXVII. iii.** into four bundles. It arises from the **iv. vi.—** common tendon of the inner condyle, **XXVIII. ii.** 15. from the ligament of the elbow-joint, and from the coronoid process of the ulna. Its tendons pass under the annular ligament, and thus flatten or expand towards the finger they are to serve, as they pass out from the palmar fascia; a tendinous sheath encloses them; they split opposite the top of the first phalanx, and at this point the tendons of the deeper muscle pass through them. The flattened tendon divides into two; its opposite edges diverge, and meet around the tendons of the profundus, forming a kind of sheath for them to pass through, and then pass on to be implanted into the second phalanx. This is a strong muscle; it bends the second joint of the fingers on the first, and the first upon the metacarpal bone.

The **Flexor Digitorum Profundus** **XVII. ii. iii.** is a muscle so like the last in origin, **—XIX.** insertion, and use, that the same de- **XXIII. ii. 9.** scription might apply to it, except that, **—XXV. i.** as it lies deeper, it has no origin from the **10; ii. 12.—** humerus, but comes from the coronoid **XXVI. i. ii.** process of the ulna, from the whole of **iii. 5, 12, 13.** the interosseous ligament, and from the **—XXVII.** edge of the radius. Its four tendons pass precisely **iii. v. vii.—** as those above described, until they pierce the split **XXVIII. ii.** tendon of the flexor digitorum sublimis; they are fixed into the root of the third phalanx. Its power

of bending the fingers extends farther than that of the sublimis.

XXVII. ii. 17. The **Lumbricales** may be mentioned here, as they arise in the palm of the hand from the tendons of the profundus. Their fleshy parts are about the length of the metacarpal bones; their small tendons stretch over two joints to reach the middle of the second phalanx. They wind around the bone, so that, though the muscles are in the palm, the tendons are affixed to the back of the fingers, together with the tendons of the extensor of the fingers, and with those of the external interossei muscles.

They are useful in performing quick, short, and light motions of the fingers, and have been named *musculi fidicinales*, as chiefly useful in playing on musical instruments.

XXVI. i. ii. The **Flexor Longus Pollicis** lies 7; *iv. 21, 22.* by the side of the sublimis; its origin **— XXVIII. 17.** is from the internal face of the radius, downwards from the place where the radius is inserted, and from the interosseous ligament all down to the pronator quadratus; a second head comes as a tendon from the condyle of the humerus and fore part of the ulna. Its tendon, having passed under the annular ligament, glides in the hollow of the metacarpal bone of the thumb, passes between the sesamoid bones to the first bone, and reaches the tip of the farthest bone, where it is inserted. Its uses are the same as the other flexors—to bend the last phalanx on the first, the first on the metacarpal bones, and occasionally the wrist on the radius or ulna.

The **Extensors** lie on the outer margin of the arm, and, with the supinators, all come from the outer condyle. They are as follows:

Ex. carpi radialis longior, }
Ex. " " brevior, } all extend the wrist.
Ex. " ulnaris, }

Supinator longus turns the palm upwards.

Ex. communis digitorum extends the fingers.

Ex. ossis metacarpi pollicis, }
Ex. primi internodii " } extend the joint of
Ex. secundi " " } the thumb.

Ex. indicis, or indicator, extends the fore-finger.

Ex. minimi digiti, or auricularis, extends the little finger.

These all roll the radius outwards, or extend the wrist or fingers. As the flexors have more fibres and greater strength, they arise from the larger inner condyle; they lie in a deep hollow, for the bones of the arm are bent to receive them, and

they form a thick fleshy cushion; but the extensors require less power, are on the convex side of the arm, and are comparatively thin.

The **Extensor Carpi Radialis Longior** is much covered by the supinator longus. It arises from the humeral ridge above the condyle, under the origin of the supinator; it comes down along the back of the radius; its tendon, which is slender, passes in a groove of the radius to the root of the metacarpal bone of the first finger. It is an extensor of the wrist; in supination, it moves the wrist sideways. It is also a pronator when the hand is turned back; and also a flexor of the fore-arm.

The **Extensor Carpi Radialis Brevior** is very similar to the last; it arises from the external condyle, where a common tendon for many muscles is formed (these are, besides this muscle, *ex. digitorum, ex. minimi digiti, ex. carpi ulnaris*); it is fleshy lower down than the extensor carpi radialis longior; its tendon runs with it, and it is fixed into the root of the metacarpal bone of the second finger. It extends the wrist, and all that was said of the last muscle applies to this also.

The **Extensor Carpi Ulnaris** arises from the common tendon of the external condyle, from the face of the ulna the whole way down. It is fixed into the outside of the root of the metacarpal bone of the little finger. It extends the wrist.

Of course, when the two extensors of the wrist act, they pull it backwards; when a flexor and an extensor of the same side act together, the hand is bent towards that side.

The **Extensor Communis Digitorum** is the antagonist to the flexors sublimis and profundus; it covers the middle of the fore-arm at the back. It arises from the common tendon, and from the interosseous ligament. The tendons are long, and pass under the annular ligament, over the back of the hand, over the heads of the metacarpal bones along the first phalanx; there they are joined by the tendons of the interossei and lumbricales; they form a tendinous sheath, which continues to its insertion in the last phalanx. The tendons, as they pass over the back of the hand, send across strips or cross-bands to each other. This muscle serves for the fore, middle, and ring finger; if it moves the little finger, it is only by a strip of tendinous fibre.

The use of this muscle is to extend all the fingers, or, when they are fixed, it will assist the extensors of the wrist.

XVI. 4.— The **Extensor Minimi Digiti** is a
XXV. i. 8. slip of the common extensor appropriated to the little finger; it passes through a channel in the annular ligament by itself, which is the best reason for making this a distinct muscle. It is inserted in the last phalanx of the little finger.

XIV. i.— The **Extensor Ossis Metacarpi**
XVII. iii. iv.
—XIX.— **Pollicis** is the shortest of the three.
XXV. i. 13. Note that muscles that extend the
—XXVI. iv. thumb must at the same time pull it away from the hand; they are also abductors.

This muscle arises in the middle of the fore-arm from the edge of the ulna and the convex surface of the radius. The tendon passes under the external ligament of the carpus, and is inserted into the base of the metacarpal bone of the thumb.

XIV. i.— The **Extensor Primi Internodii**
XVII. iv.— **Pollicis** is below the last, but exactly
XVIII.— like it; its tendon passes with the
XXV. i. 14; ii. 7.— tendon of the last to be inserted into
XXVI. iv. 8. the base of the first phalanx.
XXVII. 3, 4. the base of the first phalanx.

XIV. i.— The **Extensor Secundi Internodii**
XVII. iii.— **Pollicis**, again, is a muscle similar to
XVIII.— the last, though, as it is the longest, it
XXV. ii. 8. has a higher origin on the ulna than the two others. It is inserted by a tendon which passes the ligament, in a peculiar ring of its own, to the last phalanx at its root.

These all move the joints of the thumb, and, when acting altogether, move the whole thumb on the carpus; if the thumb be firm, they will bend the carpus.

XIV. i.— The **Extensor Indicis** or **Indi-**
XVII. iii.— **cator** has nearly the same origin and
XVIII.— course as the last, and lies beside it.
XXV. ii. 9. It lies under the common extensor, but
—XXVIII. i. 3. passes with it under the annular ligament; near the top of the metacarpal bone its tendon joins that of the common extensor. It is inserted as that muscle. It extends all the joints of the fore-finger, and acts independently of the common extensor.

MUSCLES OF THE HAND.

There are muscles, four to the thumb, and three to the little finger, which assist the flexors, and also draw the thumb and finger towards the palm, and away from it and the centre line.

They are all in the palm; none are at the back

of the hand. They form the ball of the thumb and the lesser ball of the little finger.

The **Abductor Pollicis** is subcu- XXVIII. ii.
taneous. It arises from the annular 1, 2.
ligament and the trapezium; it bends gradually round the thumb, and is inserted into the back of the first joint above the head of the metacarpal bone; its tendon, however, does not stay here, but goes on quite to the end with the tendon of the common extensor. It pulls the thumb from the fingers, and extends the second bone on the first.

The **Opponens Pollicis**, or flexor of
XIX.— the thumb, lies beneath the last-named XXVIII. ii.
muscle. It is inserted into the edge 3.
and fore-part of the large bone of the thumb; it turns the bone on its axis, draws the thumb across the fingers, as in clenching the fist, and by the same action bends the thumb.

The **Flexor Brevis Pollicis** lies XXVIII. ii.
beside the last, between the first finger 4.
and the thumb. It arises from the trapezium and ligament of the wrist; a second head arises from the magnum and uniform bones. These form two heads; one, the smaller, terminates in the first sesamoid bone. The second runs the same course to the second sesamoid bone, and into the edge of the first bone of the thumb. The two heads are separated by the passage of flexor longus between them.

The action is the same as that of opponens.

The **Adductor Pollicis** arises from XXVI. i.
the metacarpal bone of the middle 15.—
finger, where it has a flat extended base. —XXVII. 11.
It passes directly across the metacarpal ii. 5.
bone of the fore-finger to meet the thumb. It is triangular, its apex having its insertion into the root of the second bone of the thumb. It draws the thumb towards the fore-finger, as in pinching.

Thus, these muscles covering the XXVI. iv.
root of the thumb form that large ball 28.
of flesh which acts so strongly in almost everything we do. The great mass of muscle bends the thumb, and opposes it to the hand, and as this one set has to oppose the whole hand, the ball of flesh is very powerful and thick.

The short muscles of the little XXVI. iv.
finger surround its root just as those 29.
of the thumb surround its ball.

The **Abductor Minimi Digiti** forms XXVIII.
the cushion on the lower edge of the 9; ii. 6
hand just under the little finger. It is an external muscle, arising from the pisiform bone and meta-

carpal bone. It is inserted laterally into the first bone of the little finger, but the prolongation of it goes forward to the second bone. It spreads the finger sideways, and perhaps assists the flexors.

XXVIII. ii. The **Flexor Brevis Minimi Digiti** 7. is a small muscle, arising from the ligament of the wrist and the unciform bone; it is almost the same muscle as the last, has the same insertion, and performs the same office with a little more direct power of flexion.

The **Adductor Minimi Digiti** has its origin under the last muscle, from the hook of the unciform bone and the adjoining carpal ligament. It is inserted outside the metacarpal bone, which it reaches by turning round it. Its use is to put the little finger in antagonism to the others. It is also called on this account the *opponens*. It also bends one bone of the metacarpus, helps to deepen the palm, and increases the convexity of the carpus, thus forming what is called *Diogenes' cup*.

XXV. ii. 13. The **Abductor Indicis** (or first 14.—**XXVII.** dorsal interosseous muscle) is a flat 13, 14. — muscle, lying behind the abductor 5. **XXVIII. 4.** *pollicis*, and resembling it. It arises from the trapezium and first bone of the thumb, is inserted into the back part of the first bone of the fore-finger, and pulls it towards the thumb.

The **Interossei** lie between the metacarpal bones. They are adductors and abductors of the fingers. Three are in the palm, and three on the back of the hand, or four, if the abductor indicis be reckoned as one.

XXV. 13-20. The **Dorsal interossei** consist of — **XXVII.** three muscles, one on each side of the ii. 16.— **XXVIII. i.** second finger, and the third in the 6, 7, 8. space between the ring finger and the little finger; they terminate in tendons, one on each side of the second finger, and the third on the outside of the ring finger. They thus separate the fingers.

XXVI. i. 16. The **Palmar Interossei** are on the middle finger side of the metacarpal bones; their tendons are so inserted as to bring the fingers together; they are therefore antagonistic to the dorsal interossei.

MUSCLES OF THE TRUNK.

The whole back is clothed with strong muscles, and all its holes, irregularities, and spines are crowded with smaller ones. Some of these have a

distinct effect on the external form, and require on that account to be noticed here.

There are two which can be better remembered as antagonists than either alone; they are the serrati muscles.

The **Serratus Posticus Superior** IV. arises from the spines of the lowest vertebra of the neck, and the two uppermost of the back; it passes down under the tip of the scapula, and is inserted into the second, third, fourth, and fifth ribs; this muscle lifts the ribs.

The **Serratus Posticus Inferior** IV. arises with the *latissimus dorsi*, from the spines of the two lower vertebræ of the back, and the two or three uppermost of the loins. The heads are inserted into the ninth, tenth, eleventh, and twelfth ribs; this muscle draws the ribs downwards.

The **Intercostal** muscles are a XXXI. 12.— double row of muscular fibres running XXXIV. 14. diagonally from the lower edge of one rib, to the higher ridge of the one below it; they lift the ribs, and assist in respiration.

Below the serratus superior are the *splenii* muscles; below these is the *complexus*.

The **Splenii Muscles** lie under XXI. 22.— the trapezius. Each splenius, or splint XXXIII. 19. — XXXIV. muscle, arises from the four upper 2. spinous processes of the back and five lower of the neck, and is inserted into the back part of the head, that is, the occipital ridge all along to the mastoid process. At the third vertebra of the neck these muscles diverge; the tendons of the opposite splenii are closely connected with each other, and with the common tendon called the *ligamentum nuchæ*. One is called the *splenius capitis*; and the II. i. iv.— other portion of the same muscle is IVa. i. called *splenius colli*, the difference be IVa. i.— between them being that the attachment XX. 23. of the last is to the transverse processes of the neck. The splenii are antagonists of the sternomastoid muscles, and pull the head directly backward; or one, acting with the corresponding mastoid muscle, lays the ear down on the shoulder.

The **Complexus** is a mass of fibres II. i.—IVa. and tendons, mixed up together in a i.—XX. 26. complicated way, arising from several — XXI. 21. transverse processes of the back and 4. neck, and is inserted under the ridge of the occipital bone; it, too, draws the head back. So does

II. iv. the *trachelo mastoideus*; so do the smaller muscles, called *rectus capitis posticus*, major and minor.

The great muscles which move the back and loins are the *quadratus lumborum*, *sacro-lumbalis*, and *longissimus dorsi*.

X. ii. The **Quadratus Lumborum** is a flat squared muscle, arising on each side from the back part of the ilium, and from the ligaments of the pelvis which tie the ilium to the sacrum, and to the transverse processes of the loins; its chief insertion is to the lower edge of the last rib, and into the body of the last vertebra of the back.

The **Longissimus Dorsi** and **Sacro-Lumbalis** have their origin in a common tendon coming from the sacrum, ilium, and loins; the two lie side by side, the first named being nearest the spine. This common tendon is a mass of fibre that lies external to the mass of muscle; it is therefore tendinous without and fleshy within. The muscles fill up the space between the processes of the vertebrae and the ilium, and thus make full the hollow part of the back and loins. Opposite the lowest rib these two muscles break off from the common tendon. The longissimus keeps close to the vertebrae, while the sacro-lumbalis is implanted into the ribs.

Thus, in short—L. dorsi has for origin, 1, the sacrum; 2, spine of ossa ilii; 3, spinous and transverse processes of the loins; and is inserted into (1) the transverse processes of the back; (2) the lower edge of all the ribs except the two lowest. The s. lumbalis has the same origin as the last, and for its insertion all the ribs at their curvature.

The action of the whole is this: the quadratus lumborum on each side keeps the trunk erect, and when acting one at a time inclines it to one side, or turns it on its axis. The longissimus has no power but over the spine, which it bends backwards, acting continually in keeping the trunk erect. This also is the chief use of the sacro-lumbalis, but as it goes out farther on the ribs, it has more power of turning the trunk on its axis; it must also assist the serratus posticus inferior in pulling the ribs down.

Certain other muscles similar to these act in the neck. In addition, it may be mentioned that in the surface of the back from the bulge of the ribs on one side to that on the opposite side of the thorax, is a confusing surface, consisting of innumerable hollows, processes, and points of bone, and tied from point to point with innumerable small muscles of unequal bundles of mixed tendon and flesh. There are many points, as the spinous,

transverse, and oblique processes of the vertebrae, and the bulging heads and angles of the ribs; and each process has its distinct sets of muscles and tendons.

MUSCLES OF THE ABDOMEN.

These cover in the abdominal viscera, and fix the pelvis to the trunk, which they bend and turn. They steady the body in lifting weights or heavy loads, or in similar violent exertion.

The **Obliquus Abdominis Ex-** VII.—X. i. **ternus** (or descendens) is the anterior; —XXX. 8.—XXXII. 17. it is also the largest. It comes from —XXXIII. the eight lower ribs by distinct fleshy 16.—XXXV. i. 1, tongues. These notches are mixed 2; ii. 1.—with the indentations of the serratus XXXVIII. i. 1. magnus, and with some origins of the pectoralis and the latissimus dorsi. The origin of the muscle is its most fleshy part, whence it goes down in fibres parallel to each other, but oblique with respect to the abdomen. Its fleshy belly ceases about the middle of the side; its flat sheet of tendon then goes on to meet the similar expansion from the muscle of the other side. This meeting forms, with other tendons, the *linea alba*. Finally, it is affixed to the XXIX. 3. spine of the ilium, fleshy above the middle of that crest, and tendinous at its front edge; also tendinous into the whole of the ligament which extends from the crest to the ilium to the os pubis, called Poupart's ligament.

The **Obliquus Abdominis In-** VII.—IX. i. **ternus** arises from the spine of the —X. i.—XXX. 7.—ilium, where it is fleshy; from the XXXI. 8-10. sacrum and its spines; from the three —XXXIII. 17. lowest spinous processes of the loins (this part being the common tendon already mentioned), and from Poupart's ligament. It ascends from the iliac spine, and radiates from it. The central fibres go across the abdomen, the higher ones ascend and go towards the sternum, and the lower ones go obliquely towards the pubes. It has a flat tendon like the last, which is inserted into all the cartilages of the seventh and the false ribs, into the linea alba throughout its whole length, and into the os pubis.

The **Transversalis** is the internal IX. i.—X. ii. layer; it arises fleshy from the seven —XXXIV. 15. lower ribs, where its digitations meet those of the diaphragm; it is tendinous from the transverse processes of the last dorsal and four lumbar vertebrae, from the whole spine of the ilium

internally, and from a part of Poupart's ligament. Its fibres go across the abdomen, and its tendon

is inserted into the whole length of the linea alba, the ensiform cartilage, and the pubis.

VI. ii. The **Recti** muscles cover the front —XXX. 5.— part of the abdomen from the pubis to XXXI. 5, 6, 7. the sternum. Each rectus arises from the cartilages of the last three true ribs and the ensiform cartilage; it is about four inches broad, and terminates at the meeting of the pubic bones by a tendon. It is crossed at intervals by four tendinous intersections, by which it is divided into five distinct bellies. These are not regular in place or number; there is, however, one always at the umbilicus, and generally two above.

IX. i.— The **Pyramidalis** is a supplement XXX. 6. of the recti; it arises from the crest of the pubis; its apex is towards the umbilicus; it is inserted into the linea alba, which it tightens. The recti muscles pull the ribs down towards the pubis; the two oblique muscles of one side, acting alone, turn the trunk upon its axis. The transverse muscles tighten the linea alba so as to give effect to all the others.

The sheath of the rectus muscle is formed by the separation of expanded tendons, and lies between the tendon of the transversalis and those of the two oblique muscles. The tendons of all three abdominal muscles are firmly knitted together outside the margin of the rectus, in the region called the semilunar line.

MUSCLES OF THE THIGH.

The muscles belonging to the thigh-bone arise from the pelvis or trunk.

Some come from within the pelvis, and pass down under Poupart's ligament to the trochanter minor. These turn the toes out, as well as bend the thigh. Others come from the lower and fore part of the pelvis, pass down to the linea aspera, and draw the thigh towards the body.

Others arise from the sacrum and back part of the pelvis, pass to the great trochanter, and pull back the thigh; and lastly, some come from the internal surfaces of the pelvis, roll the thigh, and draw it back.

Thus the thigh is moved backwards and outwards by

Gluteus maximus	} inserted into	{	Linea aspera.
„ medius			Trochanter major.
„ minimus			Top of trochanter

The thigh is moved backwards and rolled on its axis by

Pyriformis	} inserted into	{	Root of tro- XXXVIII. ii. 17.
Obturator externus			Root of tro- XXXVIII. ii. 15, 16.
Obturator internus			Root of trochanter.
Quadratus femoris			Between the XXXVII. 1. 7; ii. 2. trochanters.

The thigh is moved forwards and the toe pointed outwards by the

Psoas magnus	} inserted into	{	Trochanter minor.
Iliacus			„ „
Pectineus			Linea aspera.
Triceps femoris			„ „

An artificial method of remembering these muscles is this: leave out the tensor of the sheath of the thigh, and the gracilis, there remain twelve muscles, viz., four inserted into the patella, four to bend the leg, and four adductors to bring the thighs together.

The thigh is enclosed by a strong sheath of fascia, which sends down partitions between the muscles which are supported by them; it is fastened firmly to the ilium, Poupart's ligament, the ischium, the coccyx, the sacrum, the ligament of the joint, the great trochanter, and the linea aspera all the way down to the knee. It is thicker at its outer and back part, and thinner on the inner side of the thigh. Its use is to embrace the muscles, and give them origin, and it enables the whole weight of the body to be hung up, as it were, to the pelvis. When the weight of the body is thrown on to one leg, the other being relaxed, the body, supported by the spine and the spine by the pelvis, weighs behind the centre of the acetabulum; then the fore part of the ilium rises, the fascia is stretched, and the muscles become braced; the patella is drawn up, the knee grasped by the membranes, and the leg extended. The weight of the body, thus operating on the fascia, relieves the muscular exertion necessary to keep the body in position.

This fascia is stretched by a peculiar XXXV. i. 11. muscle, the **Tensor Vaginæ Femoris** — XXXVI. i. 1.—; it arises from the upper spinous XXXVIII. i. 8, 9. process of the ilium, near the spine, by an attachment about an inch in length. It is fleshy at its middle, and extending downwards, and obliquely backwards, is inserted (almost in the middle of the thigh) into the two layers of which

the sheath is composed. Its use is as an abductor, and to make the fascia tense; it may also turn the toes inwards.

XI. iii. — The **Psoas Magnus** is a long and
XXXV. i. fleshy muscle; it fills up the space on
— XXXVI. either side of the inside of the spine,
ii. 3. —
XXXVII. and arises from the last vertebræ of
i. 6. —
XXXVIII. the back, and all those of the loins.
ii. 2.

It holds closely to the lumbar vertebræ, and arises from these bodies as much as their transverse processes. It is inserted into the lesser trochanter, and into the body of the thigh-bone near that process; it moves the thigh forward, and supports the pelvis on the thigh. Associated

X. ii. with it is *psaos parvus*, which arises with the last, and is implanted into the edge of the pelvis.

X. ii. — XI. i. The **Iliacus** occupies the whole con-
cavity of the ilium; it arises from the
i. 14. —
XXXVIII. last lumbar vertebræ and the whole of
ii. 1. the hollow of the ilium from its crest; it passes over the pubes by a tendinous surface to the lesser trochanter. It is joined by the psoas magnus in the corner of its descent towards the rim of the pelvis. The use of these muscles is to bend the thigh; the psoas, having a more extended origin, supports the back.

IX. i. — The **Pectineus** arises from the
XI. iii. — pecten, or pubes, lies beside the last-
XXXV. i. 15. named muscle, and is inserted with
— XXXVI. i. the common tendon. It arises from
6; ii. 4. —
XXXVII. i. the upper and fore part of the pubes,
2. above the foramen, and is inserted into the linea aspera, below the trochanter minor. It closes the knees together, pulls the thigh forwards, and turns out the toe.

There are three muscles, adductors, which have been described together as the triceps femoris; they are very important, and must be taken separately.

IX. i. — The **Adductor Longus** is the
XI. iii. — uppermost layer, and ranges with the
XXXV. i. 16. pectineus. It arises from the upper
— XXXVI. i. and fore part of the pubes and the
7, 8. —
XXXVII. i. ligament of the symphysis by a short
3. —
XXXVIII. round strong tendon. It is inserted
ii. 8. into the middle and back part of the linea aspera. It is called longus, because it is longer than the next muscle.

IX. i. — XI. iii. — The **Adductor Brevis** lies under the last, and is like it. It arises from
XXXVII. the pubes near the symphysis, under
ii. 3. the longus. It is inserted into the

inner trochanter, and upper part of the linea aspera. It is obviously shorter than the last muscle, and deeper in the thigh.

The **Adductor Magnus** is a very
IX. i. — X. i. large muscle lying under the others. — XI. iii. —
XXXV. i. 17. It arises from the ramus of the pubes — XXXVI. and the ramus of the ischium. It
i. 9. —
XXXVII. descends to be inserted into the whole
i. 4; ii. 4. —
XXXVIII. length of the linea aspera, and by a
ii. 10. — XI. i. tendon into the inner condyle of the
ii. 5. femur. It is a flat partition between the front and back of the thigh.

They all thræe press the knees together; they bring the thigh forward when it is behind, and keep the body perpendicular over the thigh. They are powerful, by reason of the great distance of their origin from the centre of the bone, which gives them a strong pull at right angles.

The **Obturator Externus** arises
XI. iii. — from the obturator ligament, which
XXXVII. i. 8; ii. 1. is stretched completely across the thyroid or obturator hole, and also from the bone around the ligament; it winds or twists under the thigh-bone, between it and the pelvis, and is inserted into the root of the great trochanter. It is a rotator of the thigh.

The three glutei muscles lie one under the other, and form the mass of flesh outside and behind the ilium.

The **Gluteus Maximus** arises from
IX. ii. — X. i. the back of the spine of the ilium, — XI. iii. —
XXXII. 21. from the junction of the ilium and — XXXV. sacrum, from the sacrum, from the
ii. 3-7. —
XXXVIII. sacro-ischiatic ligament, and from the
i. 2-5; ii. 14. coccyx; it is inserted by a broad tendon into the root of the trochanter major, and three inches down outside the linea aspera. It pulls the thigh back.

The **Gluteus Medius** is smaller, X. i. — but, like the last, it arises from that
XXXII. 20. part of the outside of the ilium that is not occupied by the gluteus maximus, from the anterior spinous process and spine of the bone; it is inserted into the top of the great trochanter; it is fan-shaped—therefore some fibres will pull the thigh forwards. Its chief use is to pull the thigh out from the body, and to pull it backwards.

The **Gluteus Minimus** is a small
X. i. — XI. radiated muscle, under the last; it arises
i. ii. — from the lowest part of the back of the
XXXVI. i. 2; ii. 2. ilium, near the socket of the thigh-bone, and a little higher up, and forms the border of the

sciatic notch. It is inserted into the fore part of the trochanter between that process and the neck of the bone.

Then come four muscles which have their origin from the inside of the obturator ligament, the inside of the sacrum, the spinous process of the ischium, and the tubercle of that bone; these fibres converge, and are inserted into the hollow and edge of the great trochanter behind.

X. i. ii.—XI. These muscles are: the *obturator internus*, *gemellus superior* and *inferior*, —XXXVII. *pyriformis* and *quadratus femoris*. They XXXVIII. roll the thigh, and turn the toe out- ii. 15, 16. wards.

The action of all these muscles on the thigh is rather complicated, as they do not go straight to their insertions, but wind around the bone. The four last-named all bend round the axis of the bone to reach the trochanter. In the same manner do the iliacus, psoas, and pectineus go round the inner side of the bone to the small trochanter.

MUSCLES OF THE LEG.

These are not complex, inasmuch as the knee is a simple hinge joint; flexors and extensors are the two groups into which the muscles arrange themselves.

The extensors are four, viz., rectus femoris, crureus, vastus externus, and vastus internus. The flexors are five, four inside, viz., sartorius, gracilis, semi-tendinosus and semi-membranosus; and one outside, viz., biceps.

XXXV. i. 6, 7. The **Rectus Femoris** arises from —XXXVI. the anterior inferior spinous process i. 3, 4, 5.— XXXVII. i. of the ilium, and has a second head 1.— XXXVIII. from the upper edge of the acetabulum; i. 13; ii. 3.— it increases towards its middle, and XL. ii. 1. then as regularly decreases to its tendon of insertion, which is attached into the patella.

XI. i. iii. The **Crureus** arises from the front of the femur between the trochanters, and covers the whole front of the femur to within an inch or two of the joint. It is soon joined by the vastus externus and vastus internus, at its edge; below it joins the tendon of the patella, under that of the rectus.

XI. i. iii.— The **Vastus Externus** is the largest XXXV. i. of this group; it arises by a strong 19; ii. 8.— XXXVI. i. tendon from the root of the trochanter 12— major, all down the linea aspera to

that branch of it that goes to the XXXVIII. outer condyle; it touches the crureus, i. 12.— XXXIX. 1 and there connects itself with the 1; ii. 1.— XL. ii. 2.— rectus, and also attaches itself to the XLI. ii. 1, 2. outside of the patella.

The **Vastus Internus** is very like XI. i. iii.— the last; it arises from the root of the XXXV. i. 20. —XXXVI. i. trochanter minor, the front of the thigh- 11; ii. 5, 6.— bone, next the crureus, and the linea XXXVIII. i. aspera, quite down to the inner con- 14; ii. 6, 7.— dyle; it joins its tendon to that of the XXXIX. i. 2; ii. 2.— crureus; its tendon also embraces the XLI. i. 1.— patella; like the vastus externus, it XLI. ii. 4. sends strips of tendinous fibres to cross the joint to reach the tibia. Its mass of fleshy fibres descend lower than the rest, and form the cushion which covers the inner side of the knee-joint.

These four muscles form the great mass of the thigh that is in front; all are joined by tendon into the patella; this bone gives them the advantage of a pulley, by removing the force from the centre line. It is, perhaps, clearer to say that the patella is contained in the tendon of this great quadriceps muscle. The ligament below XII. iii. this bone, called the ligamentum patellæ, which goes to the tuberosity of the tibia, is really a prolongation of its tendinous fibres. Moreover, an expansion of its tendinous covering is carried all across the joint, down each side of the patella, from the vasti to the upper end of the tibia and fibula. The use of this collection of muscles is to extend the leg, as in kicking, or to bend the thigh on the trunk by the aid of the rectus.

FLEXORS OF THE LEG.

The **Sartorius**, or tailor's muscle, X. i. ii.— is the longest muscle, and crosses XII. iii.— the thigh obliquely like a fillet. It XXXV. i. 3, 4, 5; ii. 15.— arises from the anterior superior XXXVIII. spinous process of the ilium, and is i. 11; ii. 4, 5. —XL. i. 2.— inserted into the inner tubercle of the XLI. i. 6. tibia, its aponeurotic membrane spreading widely over the whole joint, as a thin sheet of tendon.

It crosses the legs, and bends the leg on the thigh; or if the leg is fixed, it bends the pelvis down on to the thigh. Of course, in bending the leg across, it rolls the femur, like the inner obturator, etc.

The **Gracilis**, or rectus internus IX. i.— femoris, is a small thin flat muscle, XXXV. i. 18; ii. 14.— arising by a tendon from the ramus of XXXVI. i. 9, 10.— the pubes, near the symphysis; it is XXXVIII. just under the skin, and passes down ii. 9.—XLI. to the knee as a round tendon, and i. 5.

running behind the sartorius, and before the semi-tendinosus, is inserted with the sartorius into the side of the tuberosity of the tibia. It is a flexor of the leg; it is also an adductor of the thigh. It is to be observed that when the leg is straight, the gracilis and sartorius cannot bend the knee; on the contrary, they keep it steady, but when the knee is once bent, they come into action.

The **Semi-tendinosus** originates in the tuberosity of the ischium (with the XXXV. ii. biceps, with which it is to some extent continuous); it passes obliquely inwards, becomes a tendon six inches from the knee, and, passing around the top of the tibia, is inserted into its head below the gracilis. Its tendon is expanded; it bends the leg.

The **Semi-membranosus**, named from its flattened tendon, arises from the tuberosity of the ischium, in front of the last muscle and the biceps; it terminates in a short tendon which, passing behind the head of the tibia, is inserted there.

This muscle lies under, and to the inside of, the last. The two together form the inner hamstring. They contribute to the movement which can be performed when the leg is flexed, that of rolling the leg on the thigh. They bend the leg. There is still another muscle which performs the rotation of the leg. It is the

Popliteus, so named from lying in the ham; it is small and triangular, deeply covered by the above-named muscles. Its origin is the outer condyle of the femur; at the back it crosses the joint, to be inserted into the triangular space at the back of the tibia. It is also useful in pulling aside the capsule of the knee-joint.

The **Biceps Femoris** has, as its name implies, two heads, a long and a short; it forms the outer hamstring; it is the single flexor on the outside of the thigh. It arises from the outer part of the tuber ischii, close to the semi-tendinosus; a second head arises from the linea aspera, from a third down the bone to the condyle. The tendons of the two heads are joined a little above the condyle, to be inserted into the outer part of the head of the fibula. Its insertion surrounds the head of the bone, and fills the space between it and the tibia, into which it is also fixed

MUSCLES OF THE FOOT.

The foot has six extensors and two flexors. The extensors are:

Gastrocnemius	} lying on the back of the leg.
Plantaris	
Soleus	
Tibialis posticus	} on the outside of the leg.
Peroneus longus	
„ brevis	

The flexors are:

Tibialis anticus	} on the front of the leg.
Peroneus tertius	

The **Gastrocnemius** is the muscle of the calf; its heads are two large fleshy bellies, which arise from the tubercles of the femur; the inner head is the larger, and arises from a part of the linea aspera and the capsular ligament.

The outer head is shorter, but arises in the same way; the two muscles meet and run down together, with a division between them; they are distinct till they reach the middle of the leg; underneath they are connected by an expansion, the lower end of which becomes tendinous, and joins that of the soleus a little above the ankle.

The **Soleus**, so named from its shape, which resembles a sole. It arises also from two heads, one from the head of the fibula and upper third of that bone. The other head comes from the back surface of the head of the tibia below the insertion of popliteus; it becomes a fleshy mass, which ends in a large tendon below the middle of the leg; this is joined by the tendon of the last muscle; they go down together to the os calcis, and form the great **Tendo Achillis**, which is inserted to the bone with an expansion of its mass to give a firmer hold. In running, walking, leaping, etc., this muscle has the principal duty. The soleus is, however, only an extensor of the foot, and has no power over the knee, as the gastrocnemius clearly has.

The **Plantaris**, misnamed from the idea that it went to the planta, or sole of the foot, to form the plantar fascia. It does not do so, but is an extensor of the foot coming from the external condyle and the capsular ligament. It is inserted into the tendo Achillis.

Its use is to pull away the capsular ligament, and keep it from damage in the great bendings of the knee; it also assists the last-named muscles.

The peronei muscles all arise from the fibula.

XII. i. ii. iii. The **Peroneus Longus** lies along
—XIII. i. ii. the fibula; it arises from the upper
—XXXIX. i. 5.—XL. knob of the fibula, and from the ridge
ii. 10, 11, 12. of the bone to about three inches from
—XLI. ii. 14. the ankle; a slip also comes from the
—XLII. i. 5; the ankle; a slip also comes from the
ii. 5; iii. 6, 7, 8. upper part of the tibia. It has a long
—XLIII. i. 1; iii. 7. tendon which, however, receives fleshy
fibres; below the middle of the leg we perceive
the tendon. It passes behind the outer ankle with
the peroneus brevis, which it leaves on its way on-
wards across the sole of the foot, where it is
inserted into the root of the metatarsal bone of the
great toe, and into the great cuneiform bone on
which it is placed.

It is an extensor of the leg, and gives obliquity to the foot, as it turns the great toe edge down towards the ground. It is continually active in walking, running, leaping and dancing.

XII. i. ii.— The **Peroneus Brevis** resembles
XIII. i. — the last, except in length. Its origin
—XXXIX. ii. 9.—XL. ii. is from the ridge of the fibula, a third
15.—XLI. ii. down the bone, and all the way down
15.—XLII. i. 6; ii. 6; iii. to the ankle. It is fleshy below. The
4, 5. tendon, with that of the last muscle,
pass together behind the ankle-bone in the same
groove and ring of membrane; but the tendons
here cross, the brevis going to the metatarsal bone
of the little toe and the cuboid. In both cases the
tendons expand a little as they take hold of the
bone. It assists the last muscle, as it turns the
outer edge of the foot upwards, which is the same
thing as turning the great toe edge down.

XII. iii. — The **Peroneus Tertius** also arises
XIII. i. — from the fibula, from its lower half.
—XXXIX. i. 8, 9; ii. 10. Its tendon does not pass behind the
12.—XL. ii. ankle, but under the annular ligament
13, 14. —
—XLIII. i. 2, 3. in front of it. It is closely connected
with the common extensor of the toes. It is in-
serted into the root of the metatarsal bone of the
little toe. It balances the action of the tibialis
anticus; both together bend the foot on the leg.

XII. i. — The **Tibialis Posticus** is a muscle
XIII. ii. — arising from the back and ridge of the
XL. i. 10.—
—XLI. ii. 20. tibia, and from the opposite and neigh-
—XLII. i. 9; bouring surface of the fibula; also from
ii. 9, 10; iii. 9, 11, 12. the interosseous ligament, quite down
to the ankle. Its tendon passes in a groove in the
inner ankle-bone, and is held in its place in the
same way as the peronei are in theirs. After pass-

ing the ligament, it expands in a hand-like form to grasp the bones of the tarsus, so that its insertion is to almost all the bones of the tarsus. This muscle pulls the toes together, and, when balanced by the peronei, it extends the foot.

The **Tibialis Anticus** crosses the XII. iii. —
XIII. ii. —
—XXXVIII. i. 22.—
head and fore part of the tibia, part of
—XXXIX. i. 3, 10; ii. 5,
the fibula at its head, and the inter-
5A.—XL. i. 11, 12; ii. 17.
osseous ligament; it adheres to two-
—XLIII. i. thirds of the bone. The tendon ap-
pears about four inches from the ankle, 6, 7.

where it commences to pass across the smooth part of the tibia; it passes then under the annular ligament, and runs to the inner side of the foot, to be inserted into the first cuneiform bone and the metatarsal bone of the great toe. It turns the great toe towards the leg, and, with the peroneus tertius, bends the foot.

MUSCLES OF THE TOES.

The long muscles are four in number: two extensors and two flexors. The former lie under the tibialis anticus; the latter lie upon the tibialis posticus.

The **Flexor Longus Pollicis** arises XII. i. —
from nearly the whole length of the XIII. i. ii. —
fibula and interosseous ligament; its XL. i. 9.—
tendon is seen a little above the inner XLI. ii. 16.
18.—XLII. i. 7, 7A; ii. 7,
ankle, behind which it passes down 7A; iii. 2, 3.—
into the foot; it passes between the two XLIII. ii. 5;
heads of the flexor brevis, and between iii. 1.
the sesamoid bones of the great toe to be inserted
into the last phalanx of the great toe. It bends
the toe, but it is useful at every step we take in
keeping the toe firm to the ground, while the
gastrocnemii raise the heel.

The **Flexor Longus Digitorum** XII. i. —
Pedis is also called perforans, because, XIII. ii. —
like the perforans of the hand, it runs XL. i. 8.—
its tendons through the split tendons XLI. i. 19.
—XLII. i. 11; ii. 11,
of a smaller flexor in the sole of the 12; iii. 10.—
foot. It arises from the back part of XLIII. iii. 2.
the tibia at its inner side, down to within three
inches of the ankle, where it becomes tendinous
and passes behind the inner ankle, crossing the
tibialis posticus; in the arch of the foot it crosses
the flexor pollicis; then divides into four tendons,
which go to the third or last bone of the toes, hav-
ing perforated the short flexor opposite the second
joint. Its use is to bend the four small toes, and
to keep the points of the toes on the ground, thus

assisting the gastrocnemii and all the muscles used in walking.

XIII. ii. — The **Flexor Accessorius** is a small XLIII. iii. 5, muscle in the sole of the foot, arising 6.

at the lower part of the os calcis from two points; it is inserted into the tendon of the flexor longus, which it assists.

XIII. ii. — The **Flexor Brevis Digitorum** XLIII. ii. 4. **Pedis**, also called sublimis and perforatus, lies under the plantar aponeurosis, and arises from the os calcis. It sends tendons forward, through the notch of the plantar fascia, to the toes; at the root of the first bone they split for the passage of the long tendon, and the forked ends are affixed to the side of the second bone of each of the four toes. The obliquity of the long flexor is compensated for by the obliquity of this muscle. Its use is to bend the first, and especially the second, joint of the toes.

XLIII. ii. 10. The **Lumbricales** are similar to those of the hand; they arise from the tendon of the long flexor, and are inserted into the sides of the first phalanges.

EXTENSORS OF THE TOES.

XII. iii. — The **Extensor Longus Digitorum** XLIII. i. — **Pedis** arises from the upper and outer XXXIX. i. 4. — XL. ii. head of the tibia, almost the whole 16, 18. length of the fibula, and the interosseous ligament. It forms four tendons, which pass under the annular ligament, and somewhat obliquely across the foot, to be inserted into the base of the first phalanx of the four toes, and is continued over the toes to the end.

XIII. i. — The **Extensor Brevis Digitorum** XXXIX. ii. **Pedis** is placed on the back of the foot 11. — XL. ii. on the outer rising; it arises from the 19. — XLIII. i. 10. heel, and from part of the annular ligament. It divides into four tendons with four heads, the two larger being inside; they cross the foot under the long extensor, and the first goes to the great toe, the other three to the toes next it; the little toe has not a tendon. The last three are inserted with the tendon of the long extensor. Their obliquity counteracts that of the long tendons. They extend and draw the toes away from the great toe.

XII. iii. — The **Extensor Proprius Pollicis** XXXIX. i. **Pedis** is a slip of muscle from the 7; ii. 7, 13. — XLIII. i. 5. fibula and interosseous ligament. It sends its tendon into the last phalanx of the great toe, which it extends.

The **Abductor Pollicis** arises from XIII. ii. — the knob of the os calcis, and from the XL. i. 13. — ligament which stretches from this XLIII. ii. 2. knob to the sheath, which belongs to the tibialis posticus. Its tendon is shown opposite the middle of the metatarsal bone. It unites with the short flexor of the great toe, and is inserted into the first bone or phalanx of the toe at its root, and into the sesamoid bone. It pulls the toe aside, and bends it a little.

The **Flexor Brevis Pollicis** lies between the abductor and the adductor, XIII. ii. — XLIII. ii. 3; upon the metatarsal bone. It arises iii. 3, 4. by a tendon from the cuboid and the external cuneiform bone. It divides into two heads; one goes to the abductor, and one to the adductor, each to have its tendon inserted with theirs into the root of the first phalanx. These tendons contain the sesamoid bones, and the parting of the two heads makes a channel for the tendon of the long flexor.

The **Adductor Pollicis** arises from XIII. ii. the heel-bone by a tendon, or ligament, which extends from the os calcis to the cuboid. This is the ligament under which the tendon of the peroneus glides; it also arises from the external cuneiform bone; it is formed of two fleshy heads, which, uniting, go to the sesamoid bones, or to the first bone of the great toe.

The **Transversalis Pedis** extends XIII. ii. across the sole of the foot from the metatarsal bone of the great toe to that of the little toe; it makes the sole of the foot deeper by bringing its edges together, and acts by contracting or relaxing its pull on the toes, as there is necessity for more or less force in planting the foot firmly.

The **Abductor Minimi Digiti** XIII. ii. — arises from the os calcis and the ten- XL. ii. 20. — dinous septum which covers the flexor XLIII. ii. 6, 7, 8. brevis; it becomes double-headed, one head being inserted into the metatarsal bone whilst the other goes on to the root of the first bone of the little toe. It bends the toe and supports the tarsus in walking, and carries the toe outwards.

The **Flexor Brevis Minimi Digiti** XIII. ii. — is a small muscle just the length of XLIII. i. 11; the metatarsal bone, from which it ii. 9; iii. 8. arises; it is inserted into the root of the first bone of the toe, which it bends.

The **Plantar Interossei** are three XIII. ii. — muscles in the sole of the foot; they XLIII. ii. 11. pull the toes together towards the great toe.

XIII. i. — The **Dorsal Interossei** are four in
 XLIII. i. 9. number; they extend the toes.

The sole of the foot is protected by a strong
 plantar fascia, which extends from the point of
 the heel down to the heads of the five metatarsal
 bones. It serves the same use as the palmar

fascia in the hand, as it protects all the parts lying
 under it, especially the blood-vessels, muscles, and
 nerves; it also supports the arch of the foot in
 standing or in motion. Passing as it does from
 heel to toe, as the string of a bow, it binds down
 the muscles and gives them origin.

PLATE I.—SKULL.

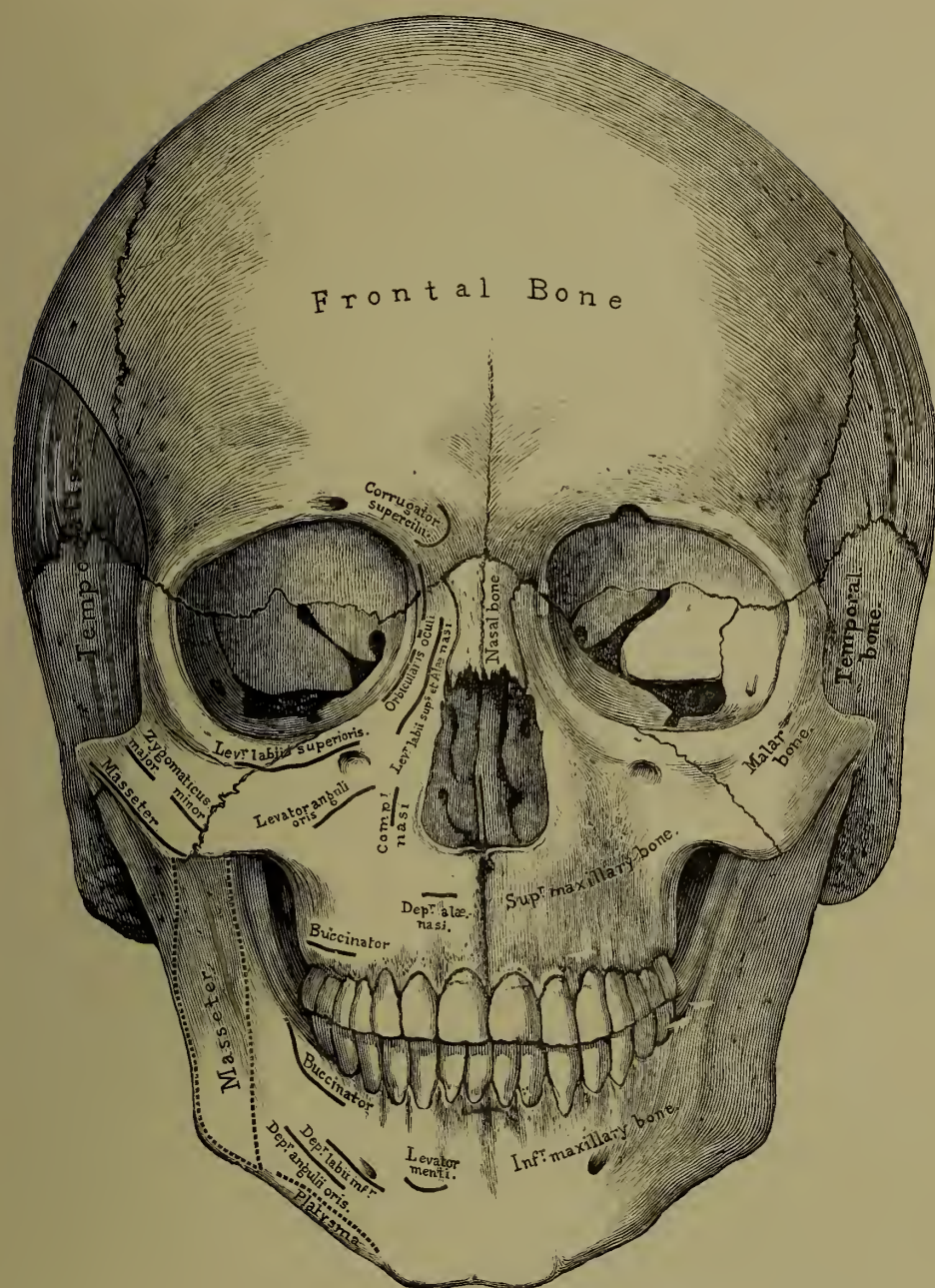


PLATE II.—BONES OF THE SKULL.

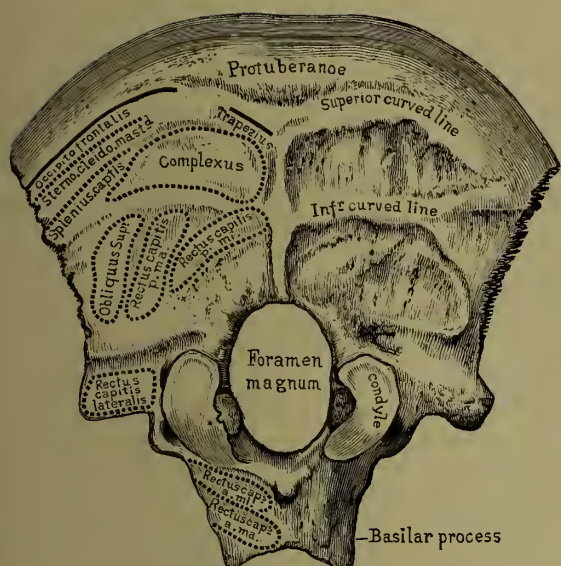


Fig. i.—Occipital Bone.

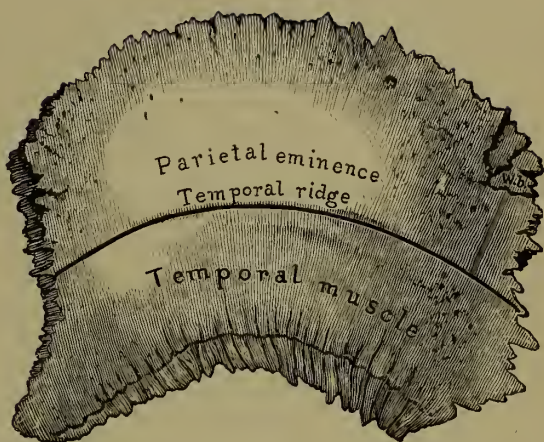


Fig. ii.—Parietal Bone.



Fig. iii.—Frontal Bone.

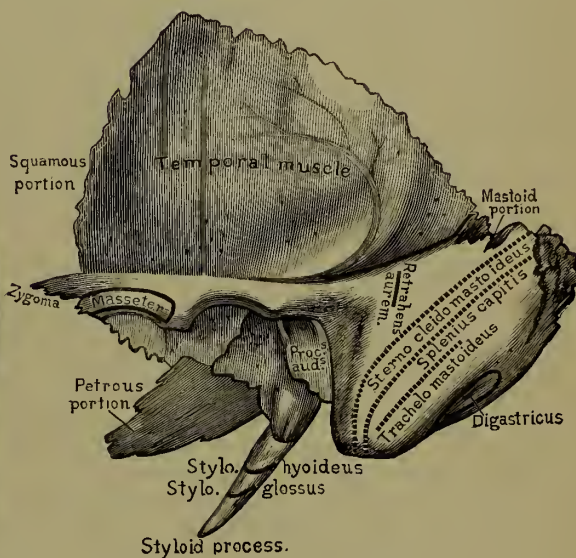


Fig. iv.—Temporal Bone.

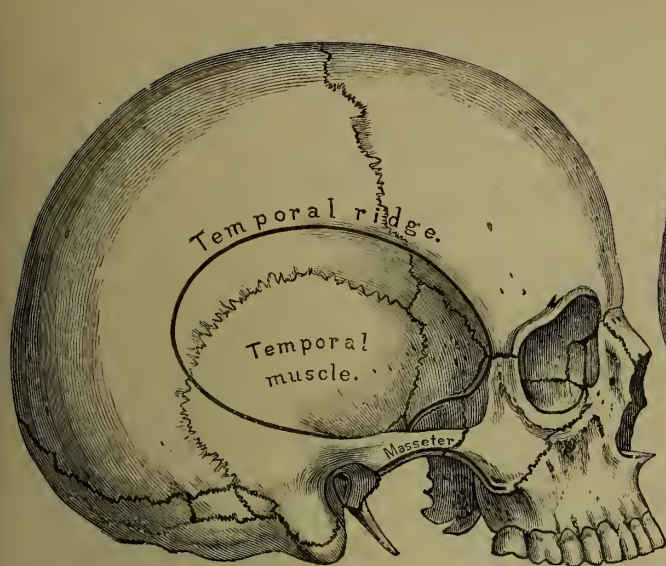


Fig. i.—Skull.

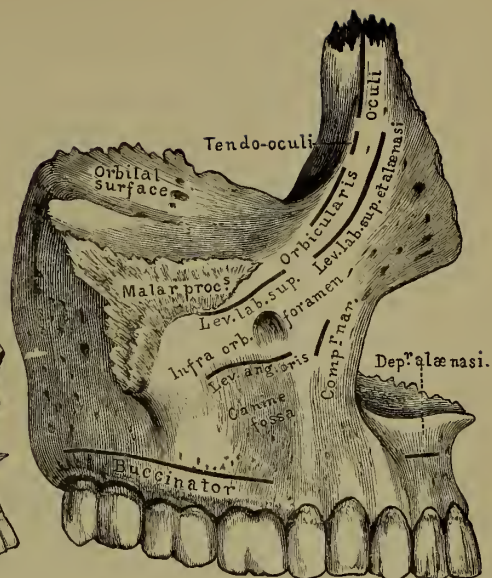


Fig. ii.—Upper Jaw.

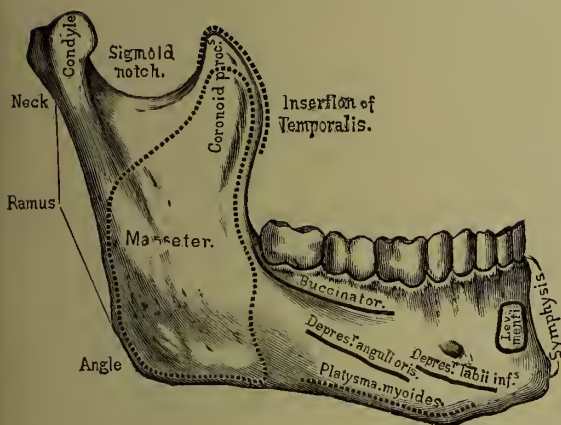


Fig. iii.—Lower Jaw, external.

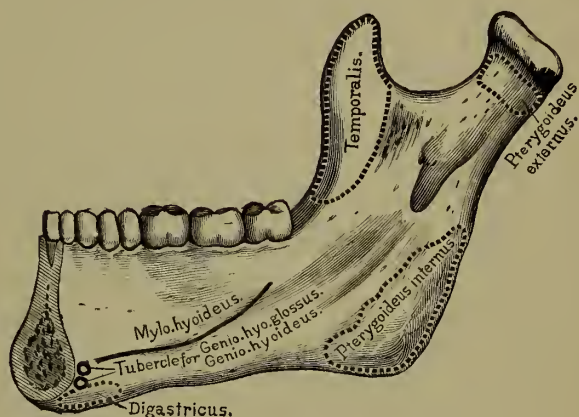


Fig. iv.—Lower Jaw, internal.

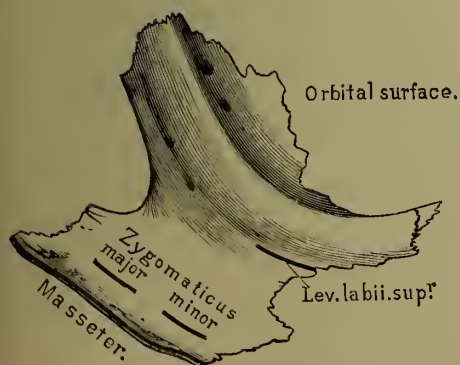


Fig. v.—Cheek (or Malar) Bone.

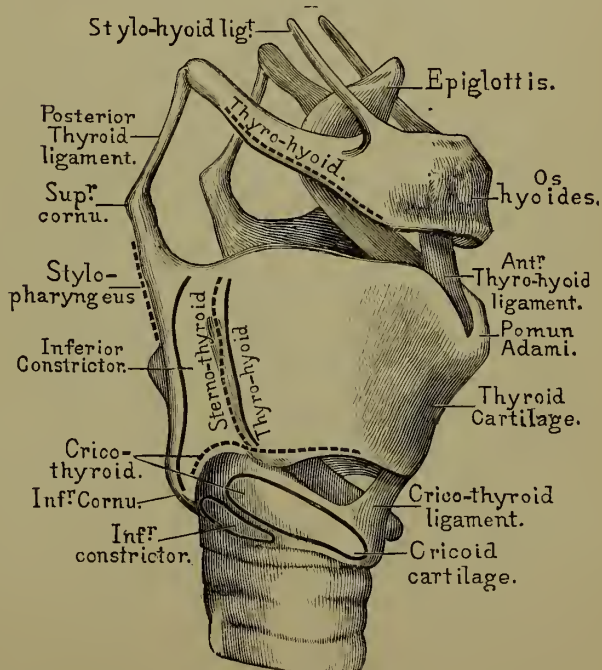


Fig. vi.—Larynx.



PLATE IV.—VERTEBRÆ AND RIBS, BACK VIEW.

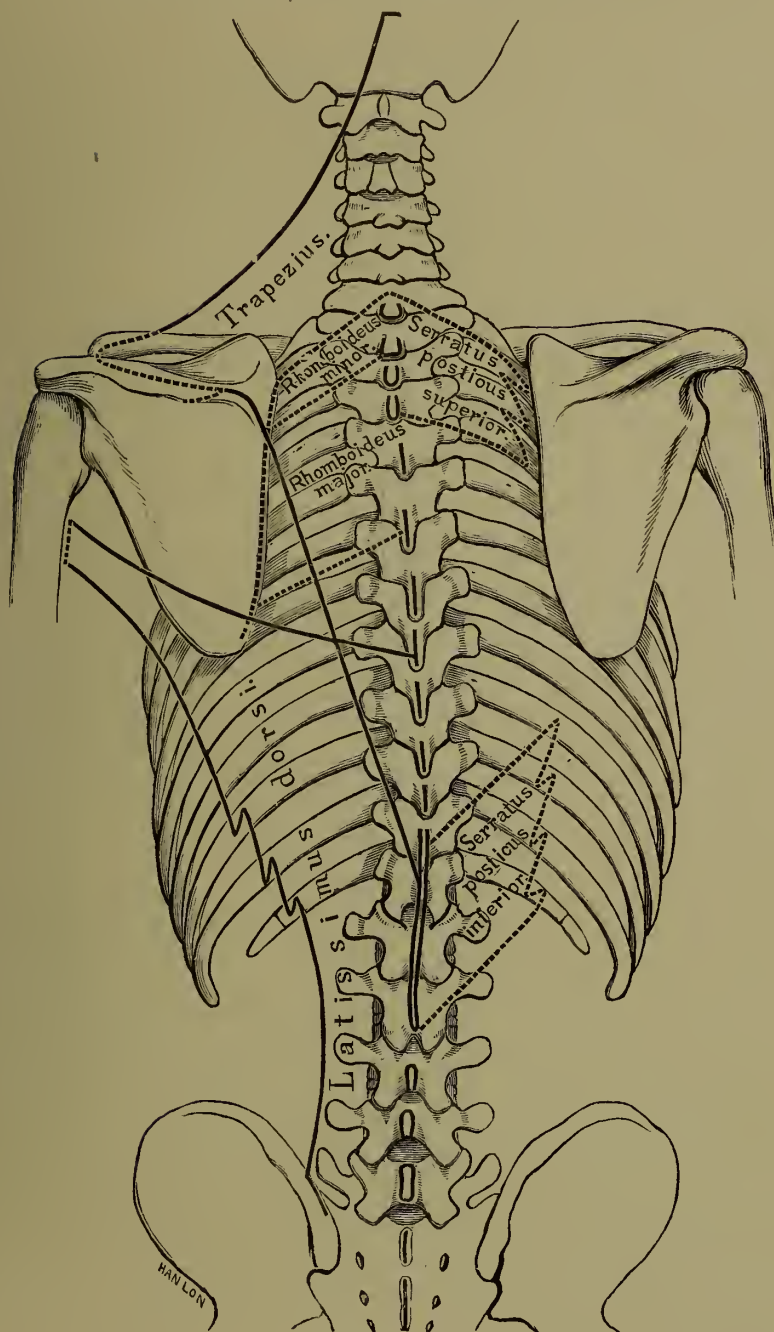




PLATE IVA.—VERTEBRÆ OF THE NECK.

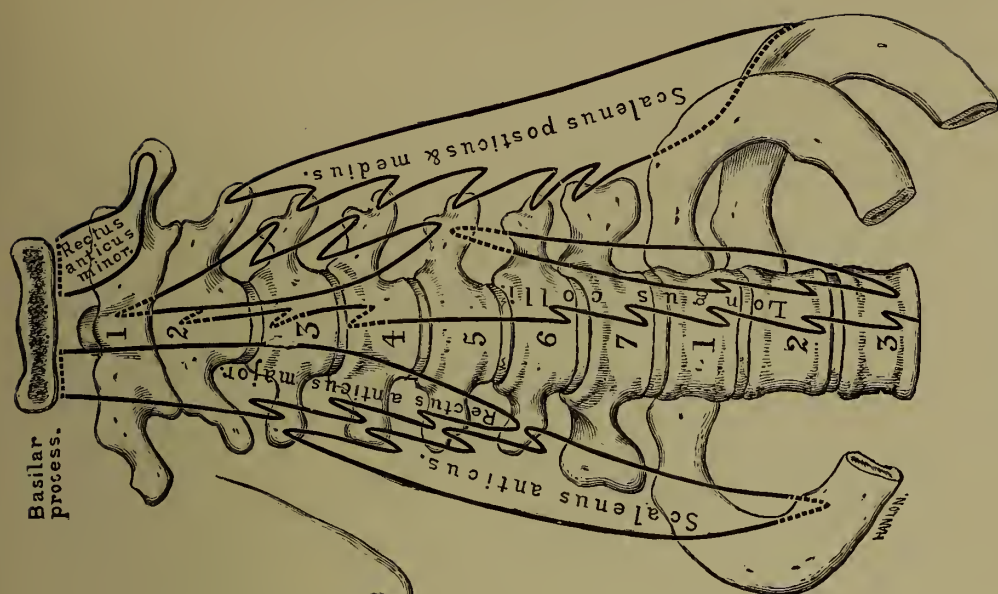


Fig. iii.—Front View.

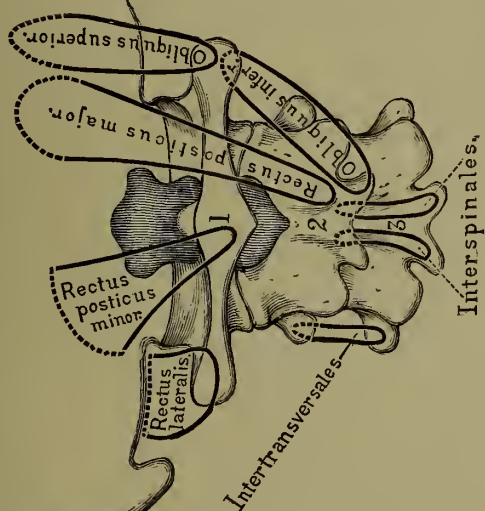


Fig. ii.—Occipital Bone, and three first Vertebrae.

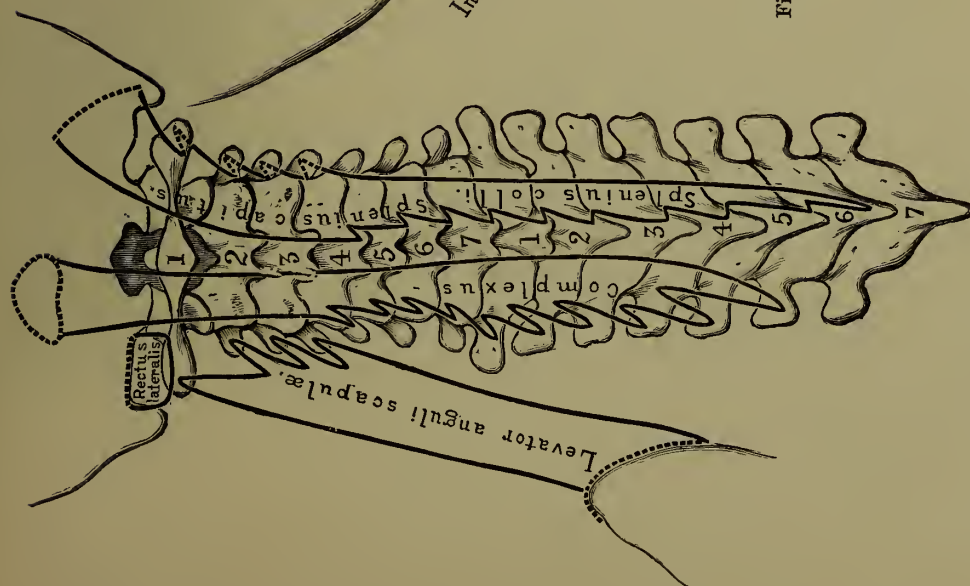


Fig. i.—Back View.



PLATE V.—VERTEBRÆ.

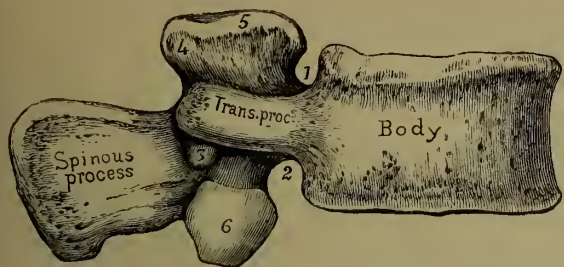


Fig. i.—Lumbar Vertebra, from the right side.—1. Superior notch. 2. Inferior notch. 3. Accessory (or posterior) tubercle. 4. Mammillary (or anterior) tubercle. 5. Superior articular process. 6. Inferior articular process.

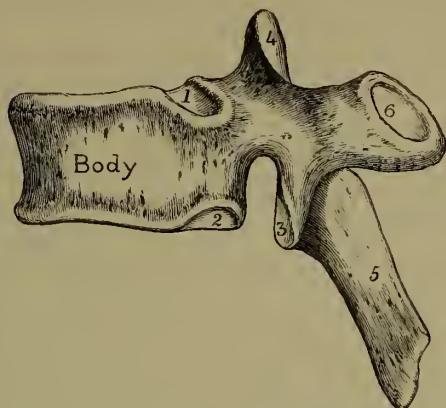


Fig. ii.—Dorsal Vertebra, from the left side.—1 and 2. Superior and inferior facets for the articulation of the head of the rib. 4 and 3. Superior and inferior articulating processes. 5. Spinous process. 6. Facet on the transverse process for the articulation of the tubercle of the rib.

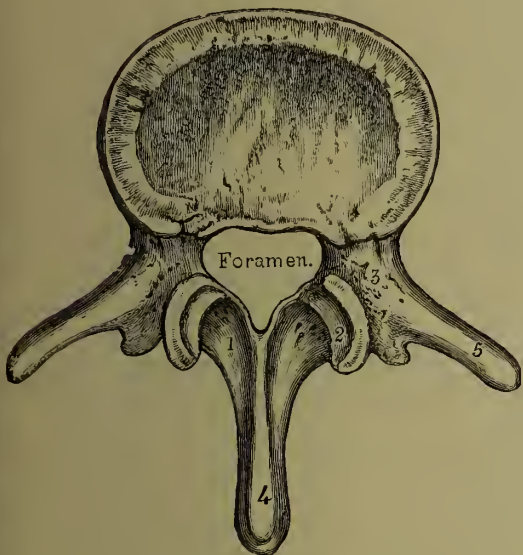


Fig. iii.—Lumbar Vertebra, from above.—1. The lamina. 2. Superior articular process. 3. Pedicle and intervertebral notch. 4. Spinous process. 5. Transverse process.

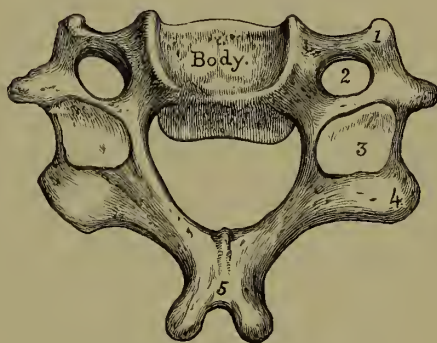


Fig. iv.—Third Cervical Vertebra, from above.—1. Anterior tubercle. 2. Foramen for vertebral artery. 3 and 4. Superior and inferior articular processes. 5. Bifid spinous process.

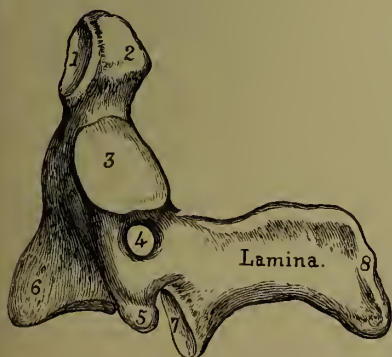


Fig. v.—Second Cervical Vertebra (or Axis), side view. 1. Articular surface for atlas. 2. Odontoid process. 3. Superior articular process. 4. Foramen for vertebral artery. 5. Transverse process. 6. The body. 7. Inferior articular process. 8. Spinous process.

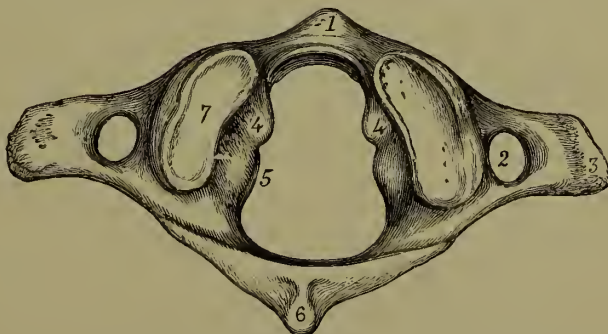


Fig. vi.—First Cervical Vertebra (or Atlas), from above.—1. Anterior arch, with a tubercle in front. 2. Foramen in the transverse process. 3. Transverse process. 4. Tubercle for transverse ligament. 5. Inferior articular process. 6. Spinous process. 7. Condylar articular process.

PLATE VI.—THORAX.

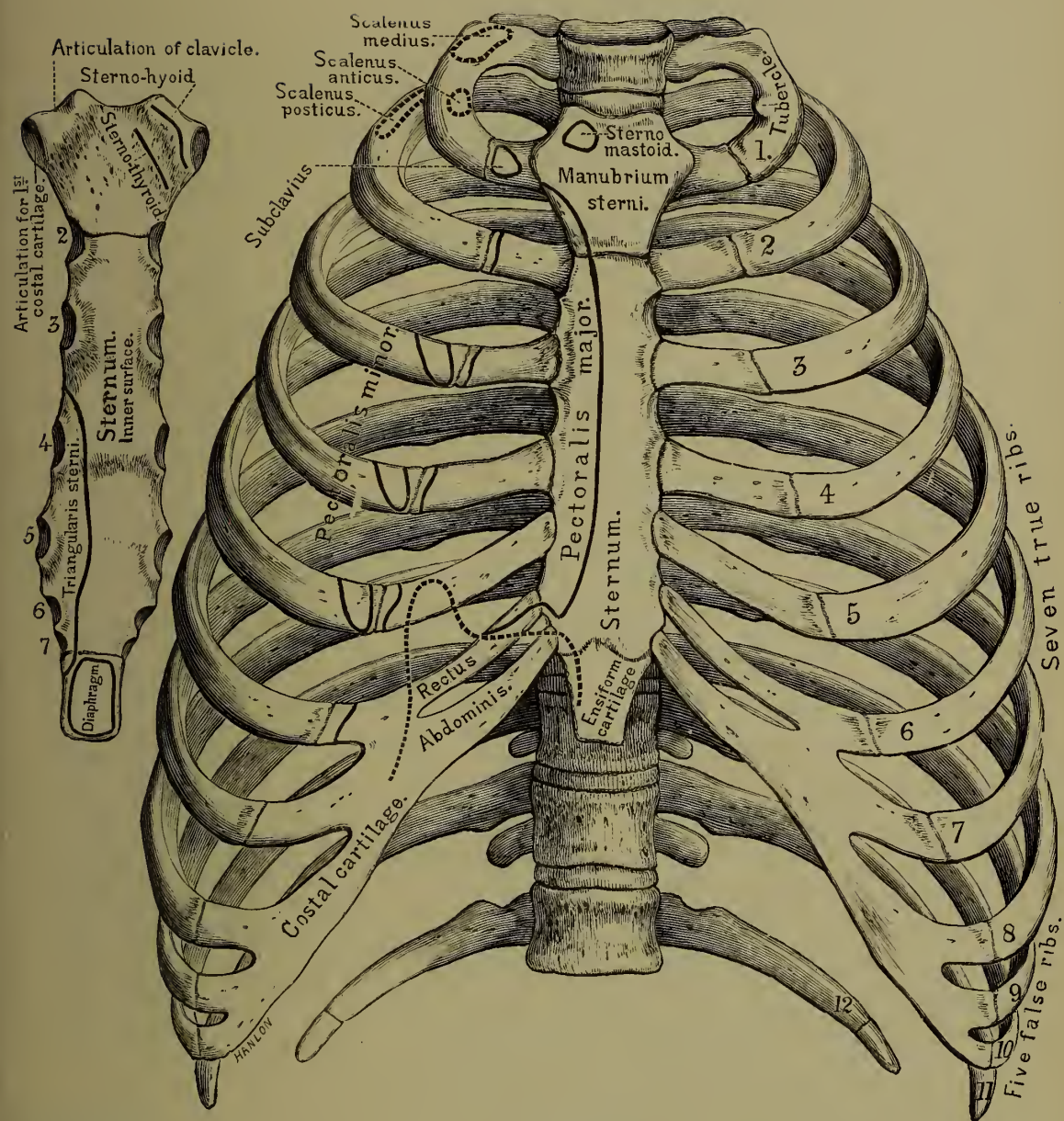


Fig. i.—Sternum, from inside.

Fig. ii.—Thorax.

PLATE VII.—RIBS, SIDE VIEW.

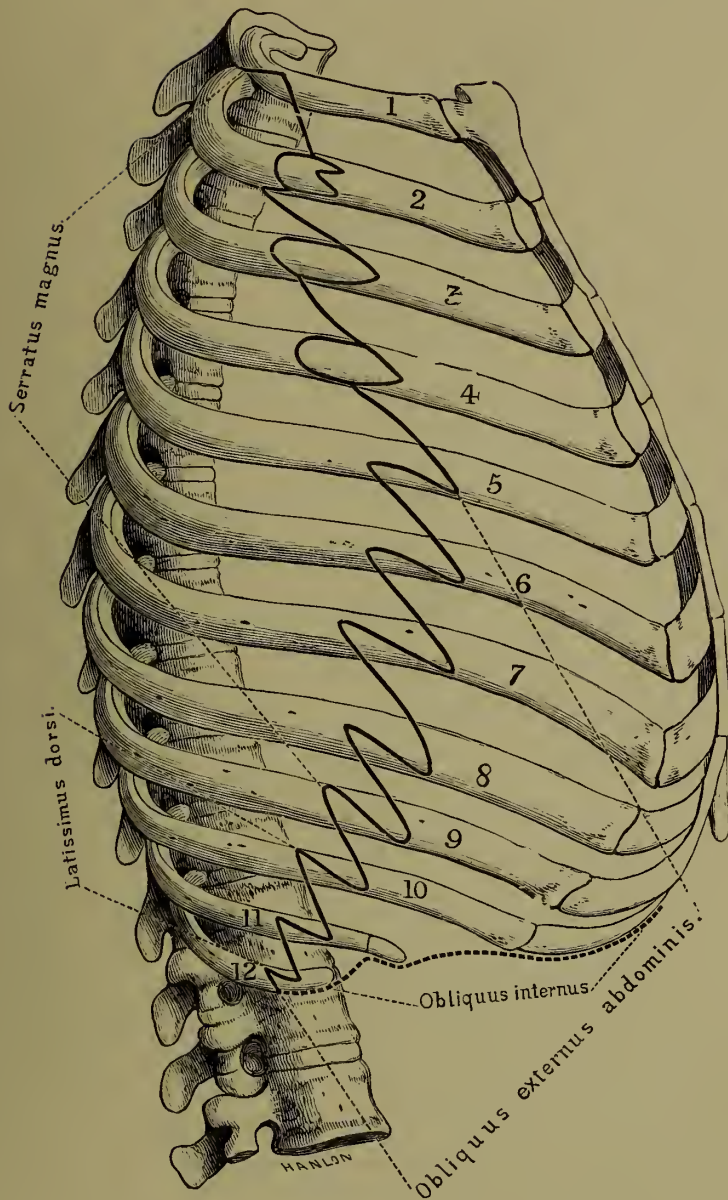


PLATE VIII.—PELVIS.

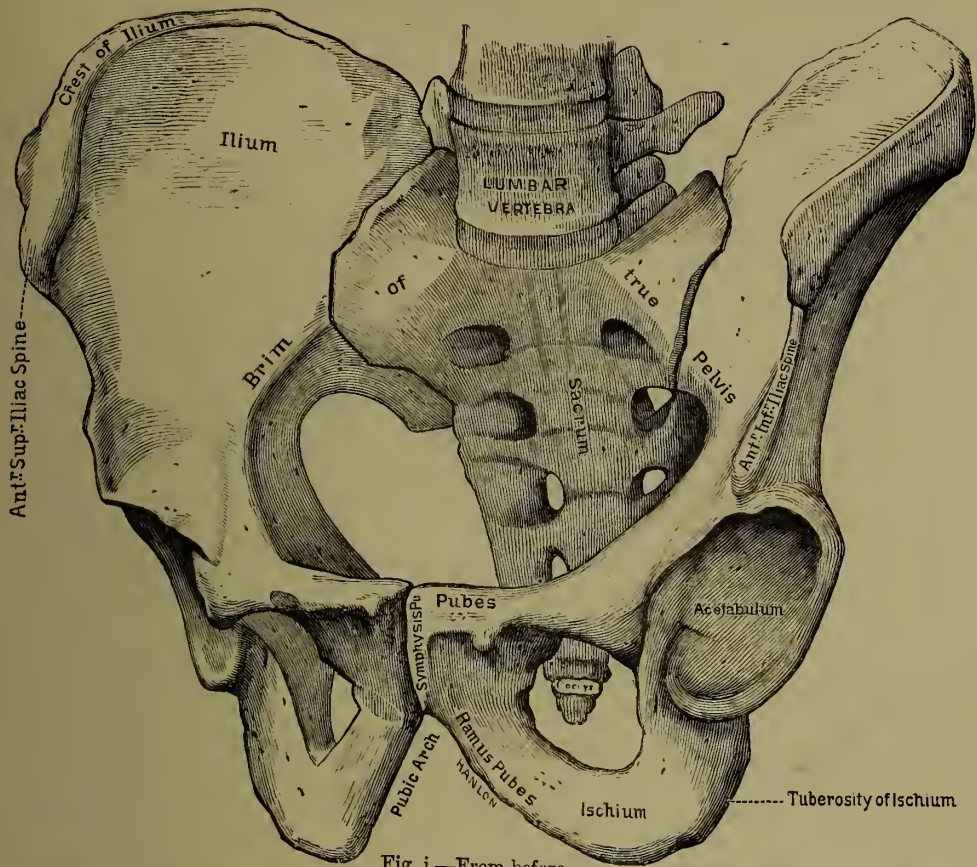


Fig. i.—From before.



Fig. ii.—From behind.

PLATE IX.—BONES OF THE PELVIS.

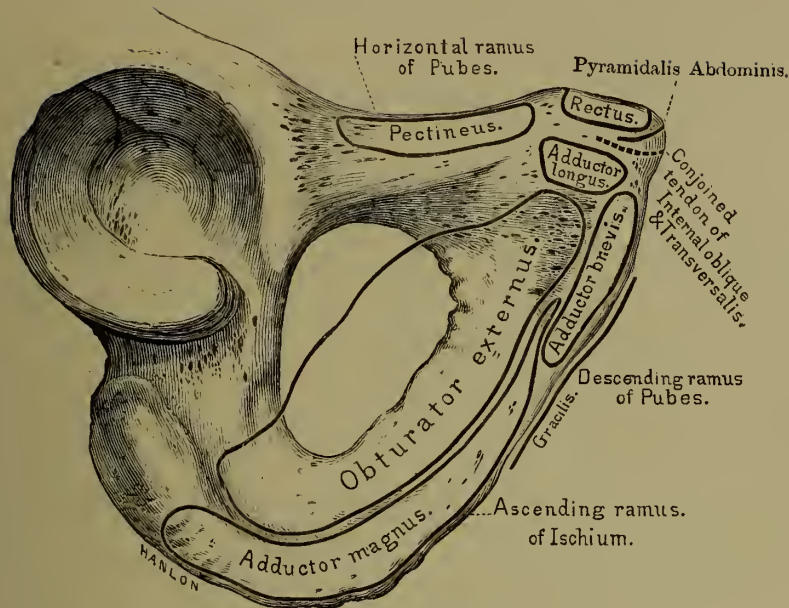


Fig. i.—Ischium and Pubes.

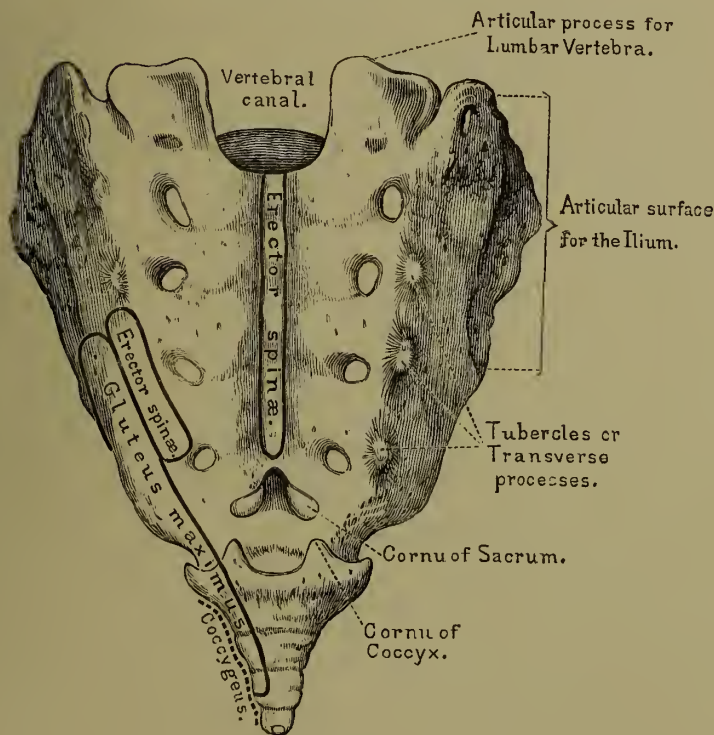


Fig. ii.—Sacrum.

PLATE X.—INNOMINATE BONES.

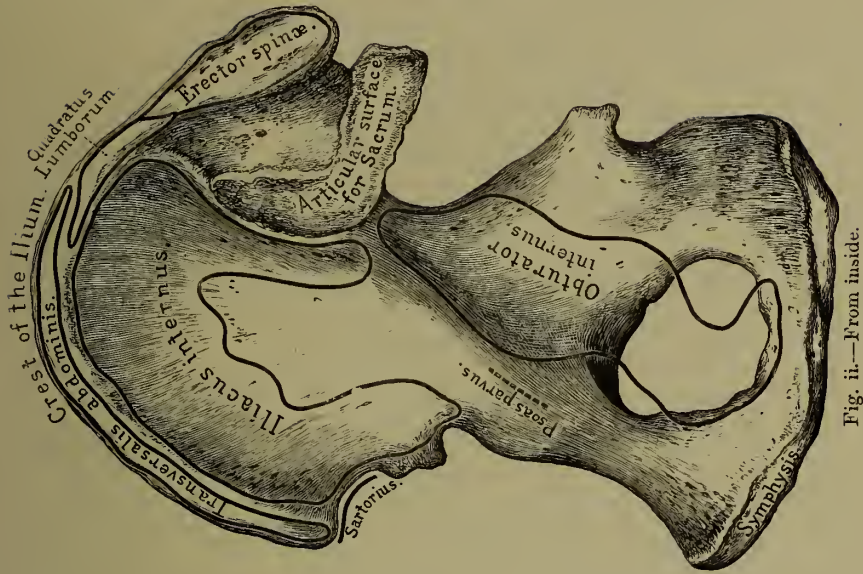


Fig. ii.—From inside.

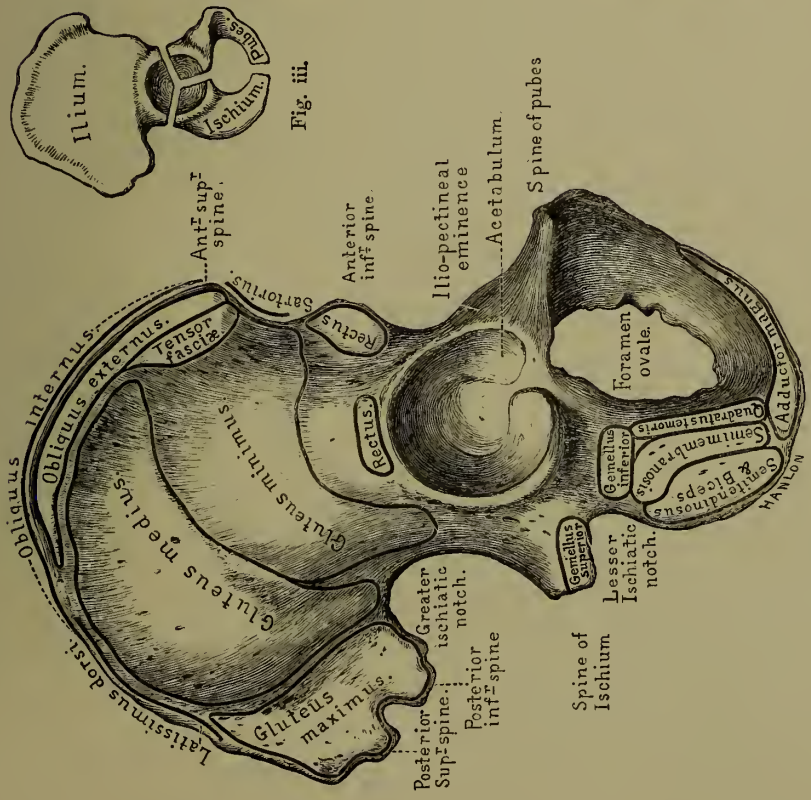


Fig. i.—From outside.

Fig. iii.

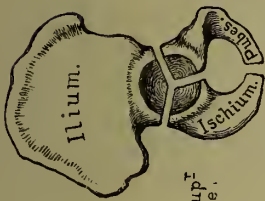


PLATE XI.—FEMUR.

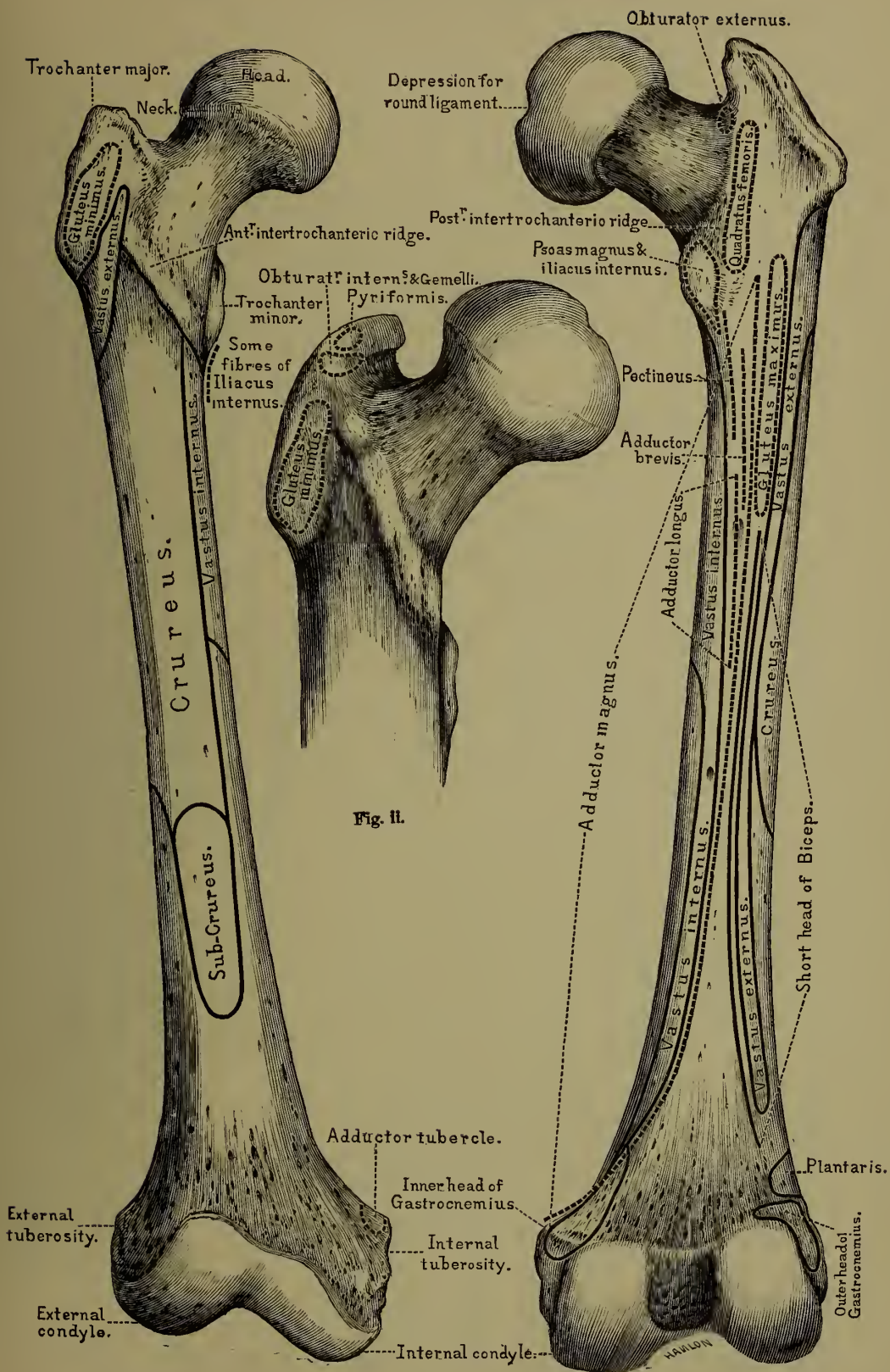


Fig. i.—Anterior surface.

Fig. iii.—Posterior surface.

PLATE XII.—BONES OF THE LEG.

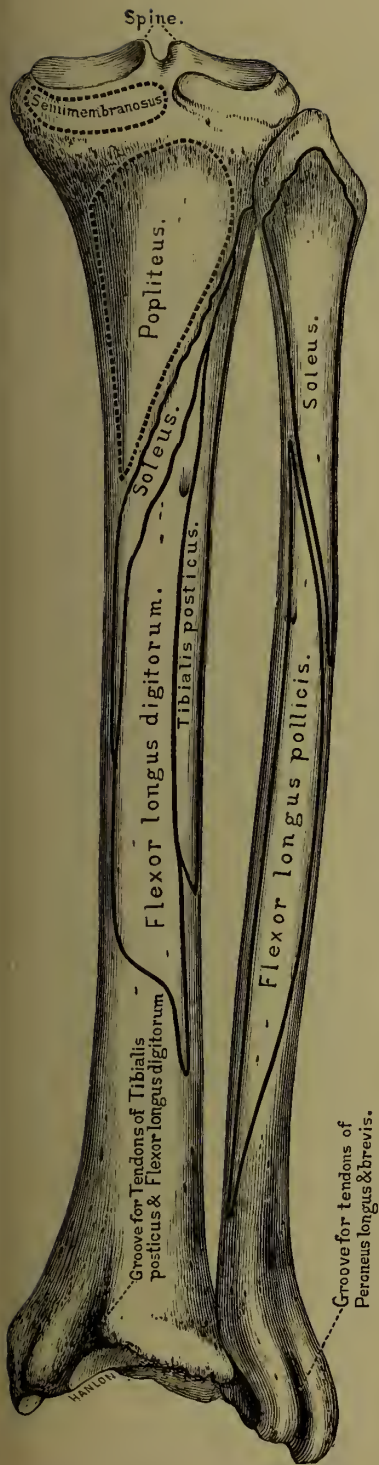


Fig. i.—Tibia and Fibula, posterior.

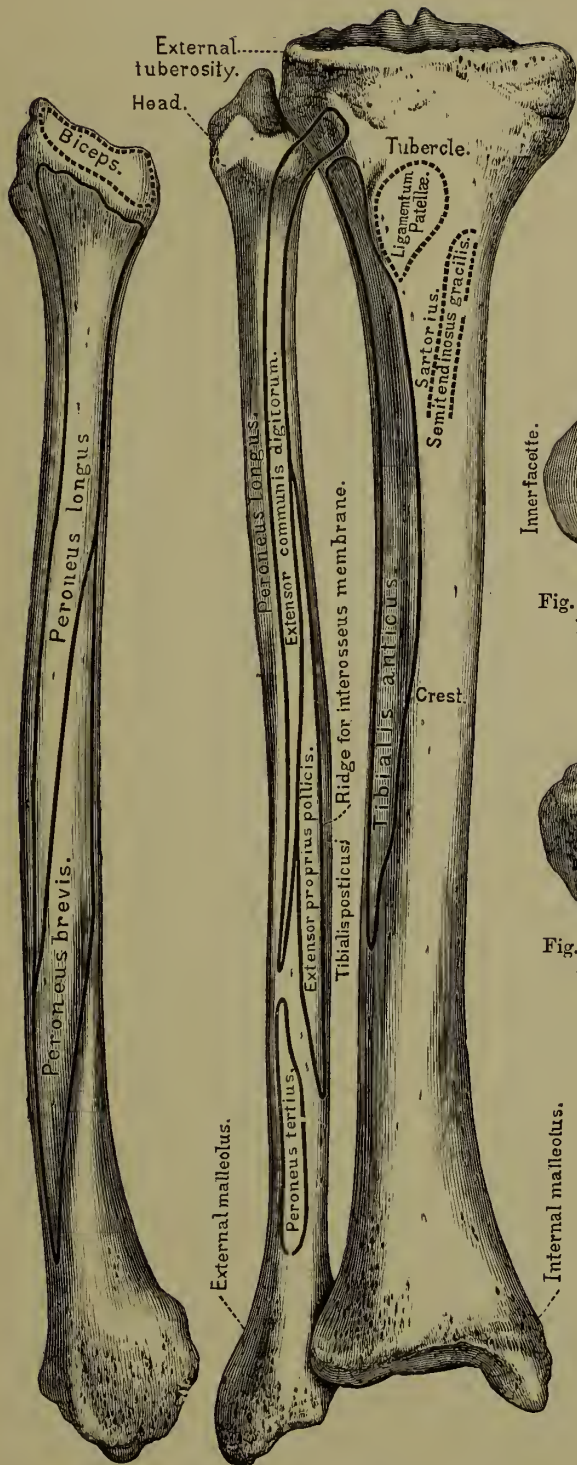


Fig. ii.—Fibula.

Fig. iii.—Tibia and Fibula, anterior.



Fig. iv.—Patella, posterior.

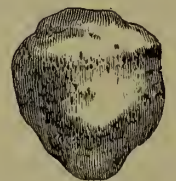


Fig. v.—Patella, anterior.

PLATE XIII.—Foot.

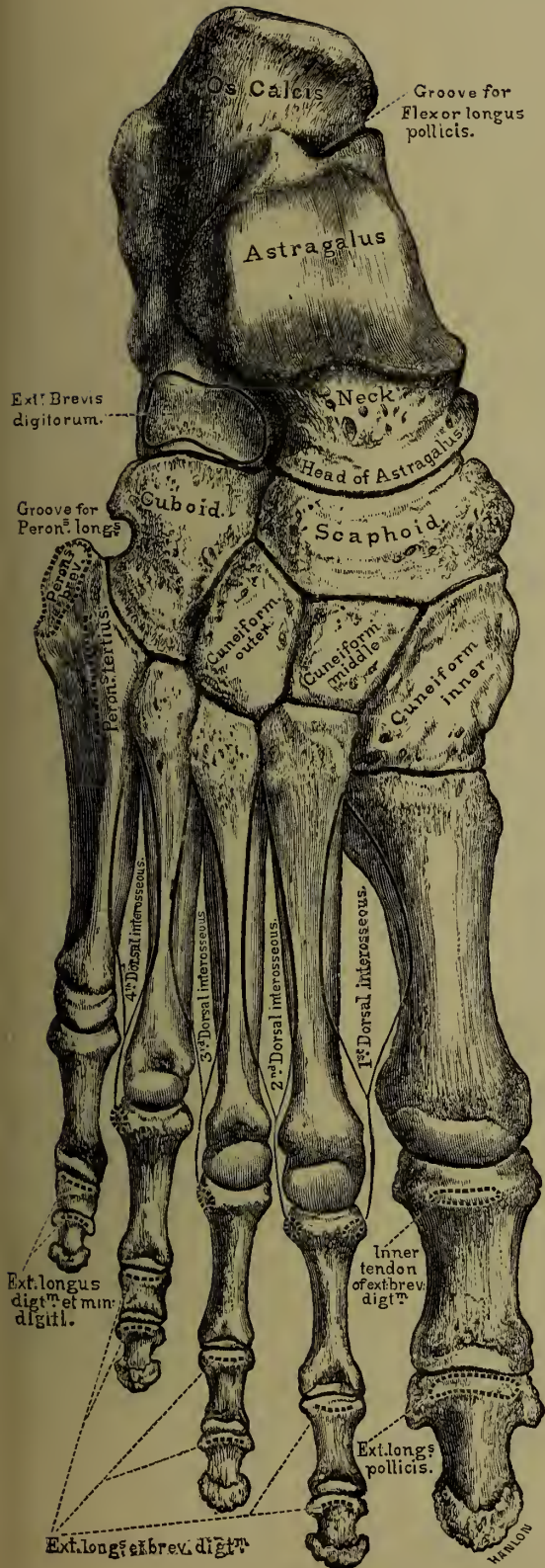


Fig. i.—From above.

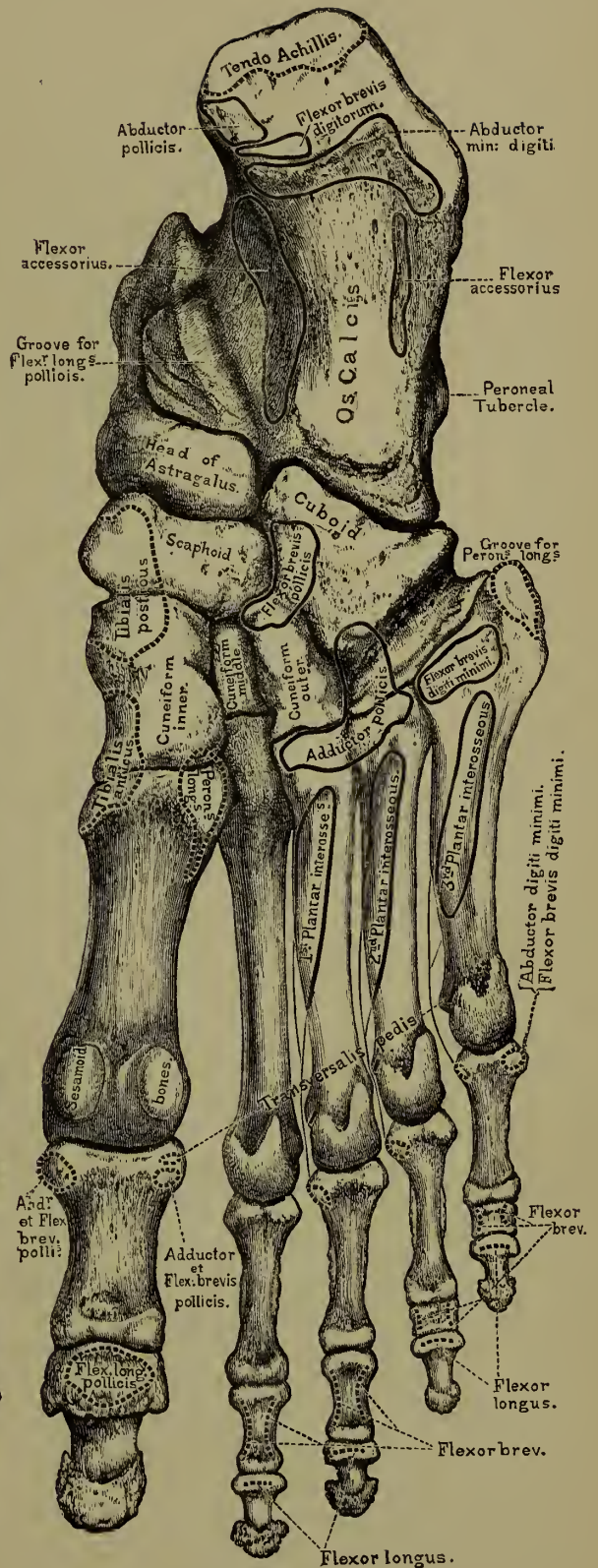


Fig. ii.—From below.

PLATE XIV.—BONES OF THE WRIST AND FOOT.

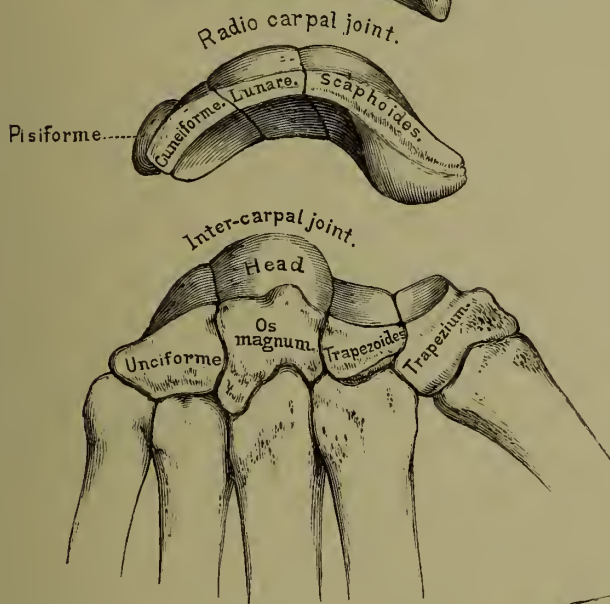
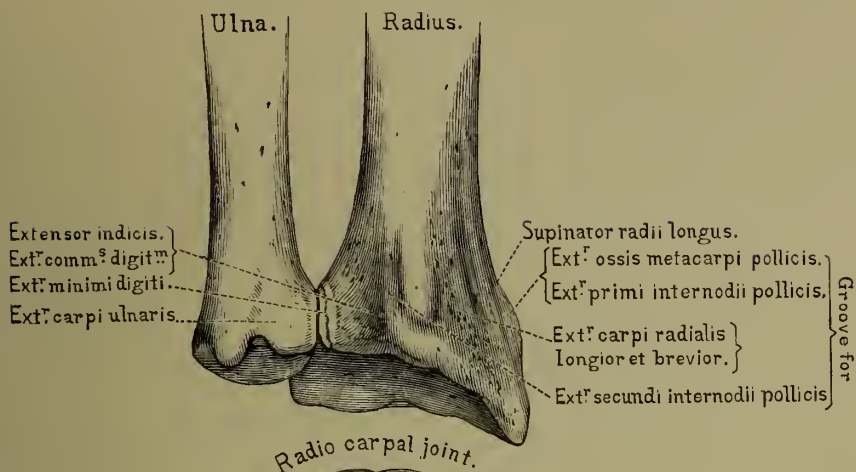


Fig. i.—Bones of the Wrist.

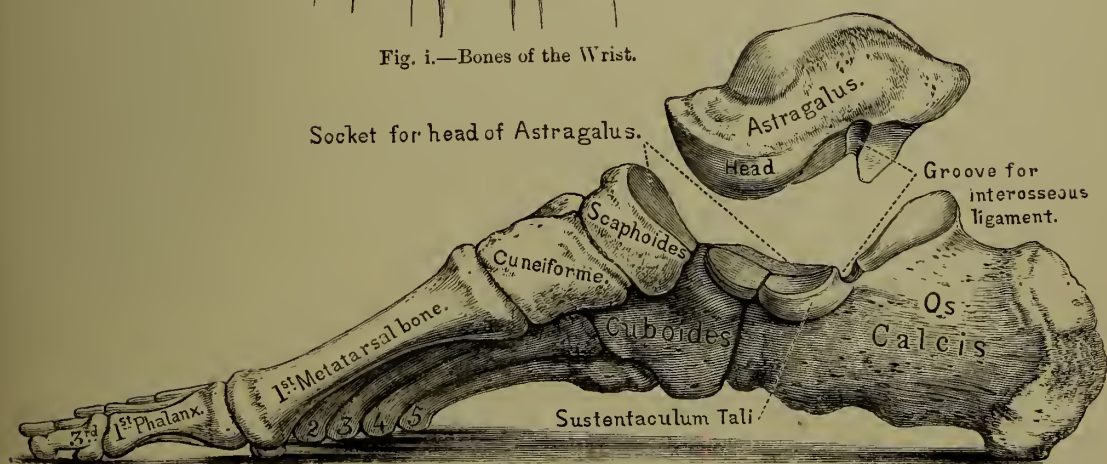


Fig. ii.—Bones of the Foot.

PLATE XV.—CLAVICLE AND SCAPULA.

Fig. i.—Right Clavicle, from below.

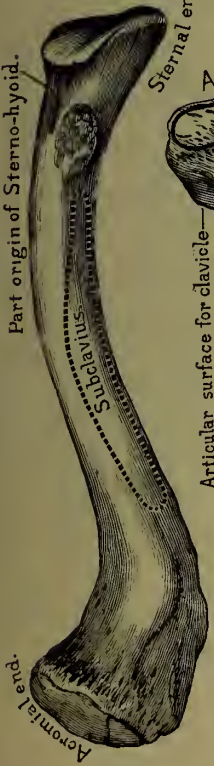


Fig. ii.—Right Clavicle, from above.



Fig. iii.—Right Scapula, from behind.

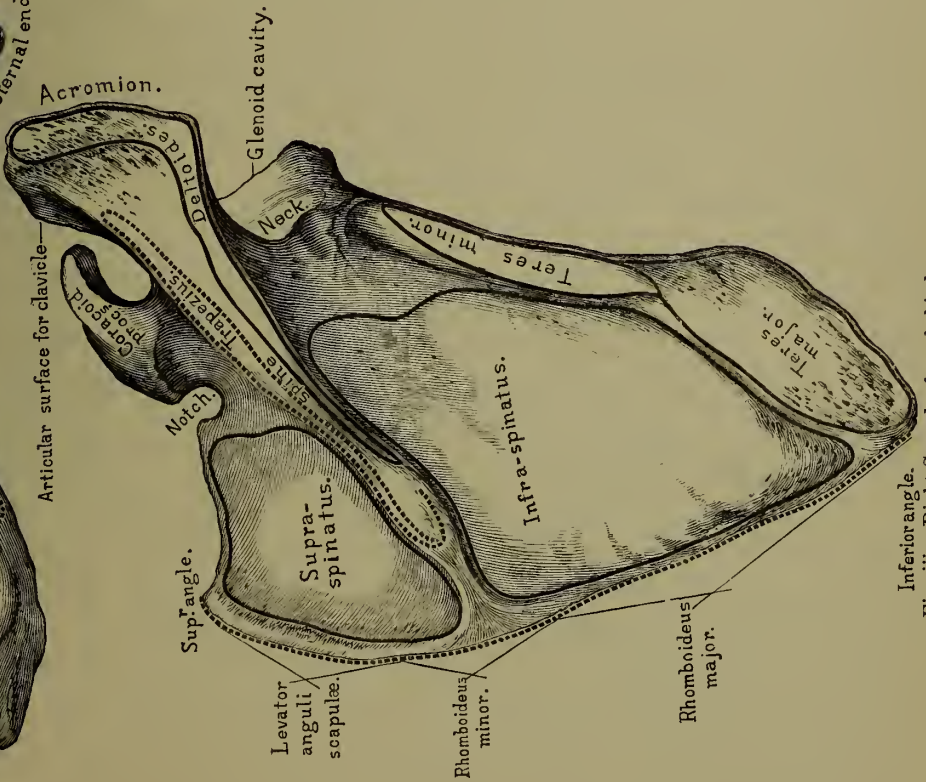


Fig. iv.—Right Scapula, from before.

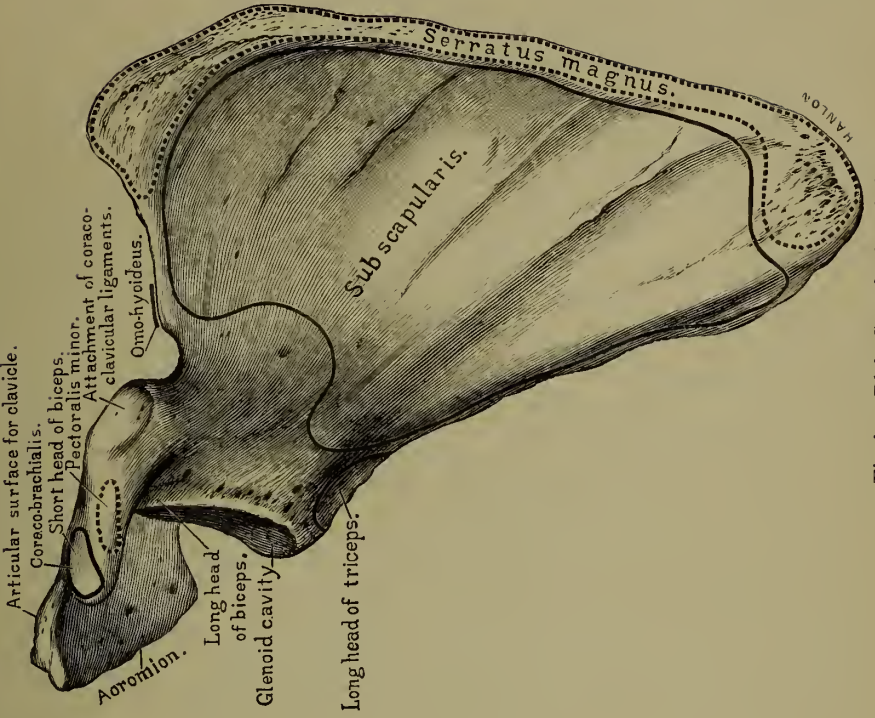


PLATE XVI.—UPPER ARM.

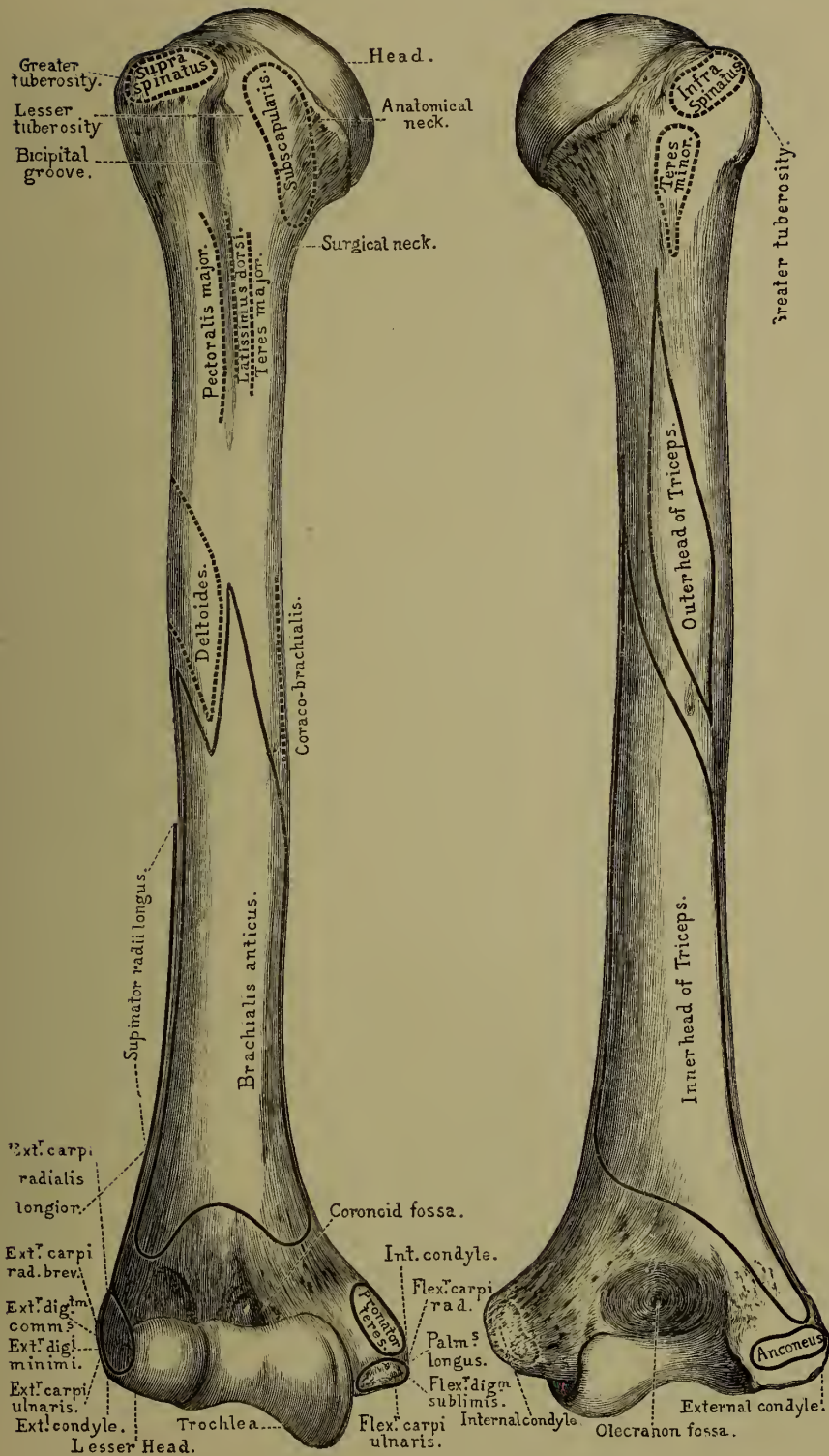


Fig. i.--Right Humerus, from before.

Fig. ii.--Right Humerus, from behind.

PLATE XVII.—BONES OF THE FORE-ARM.

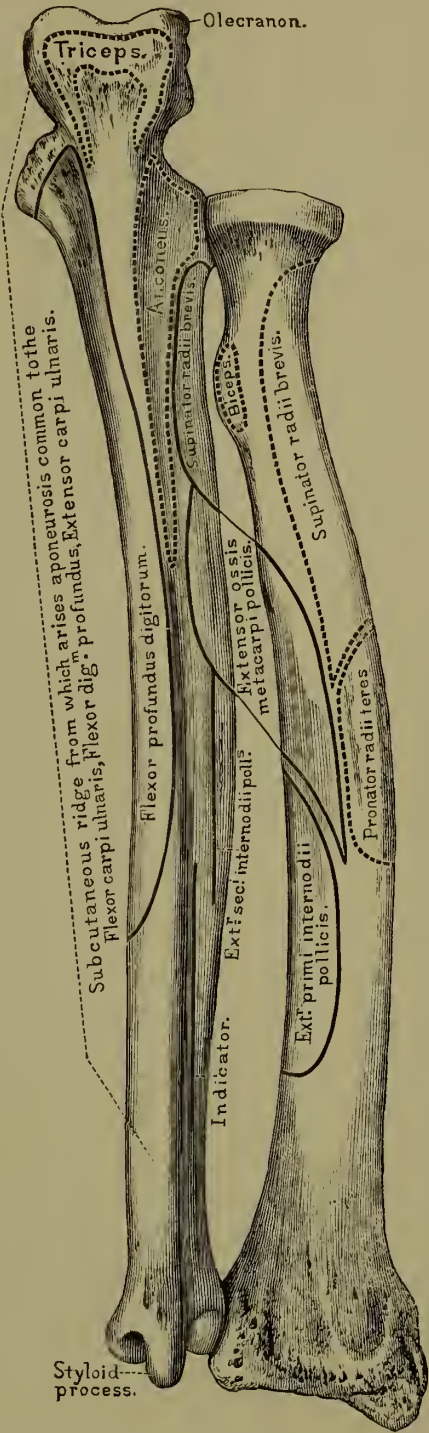
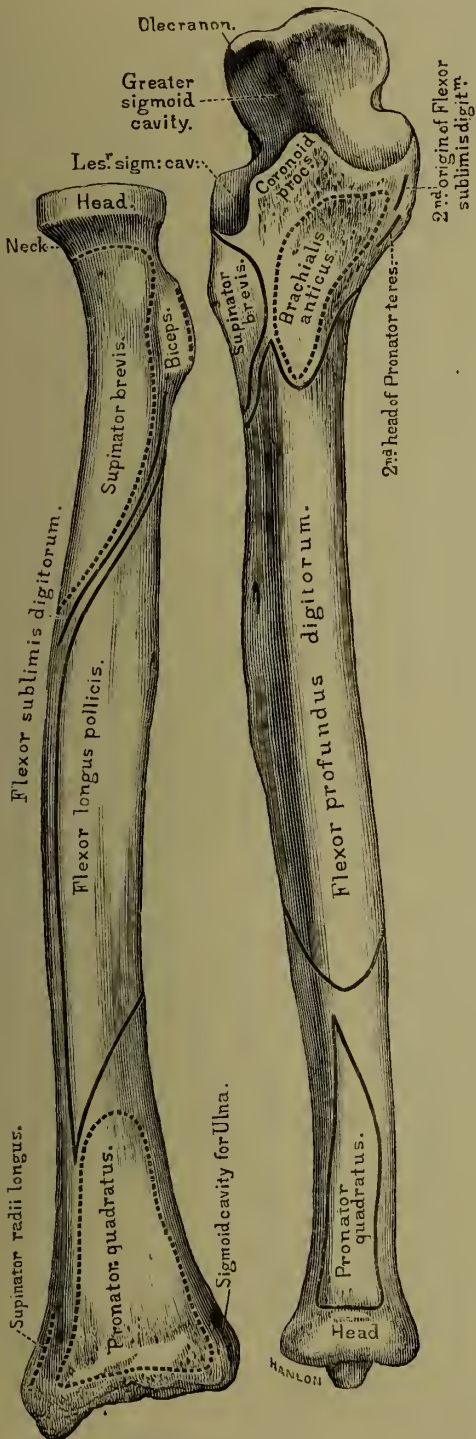


Fig. i.—Right Radius, from before.

Fig. ii.—Right Ulna, from before.

Fig. iii.—Right Ulna, from behind.

Fig. iv.—Right Radius, from behind.

PLATE XVIII.—RIGHT HAND, BACK.

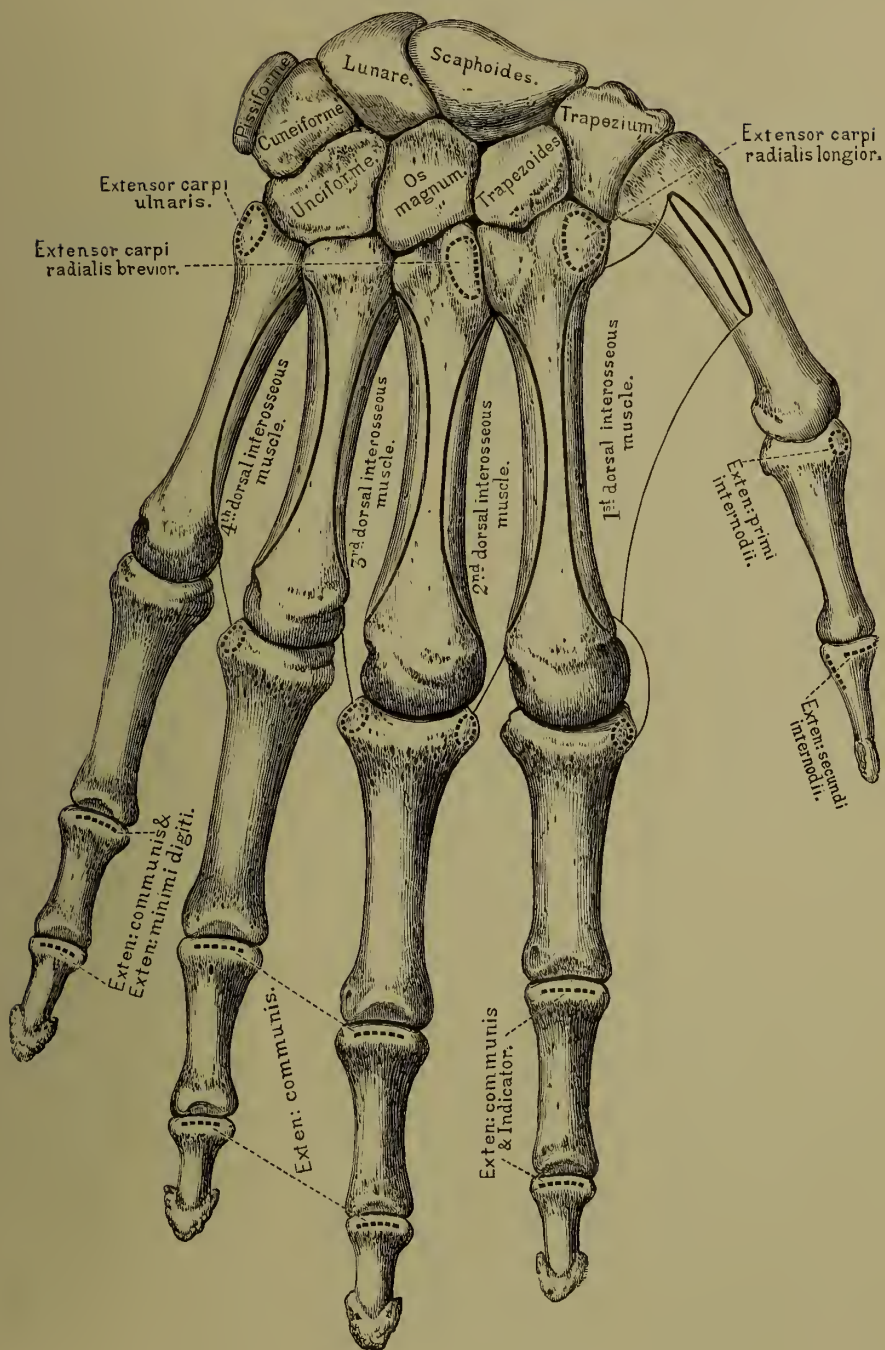


PLATE XX.—HEAD AND NECK.

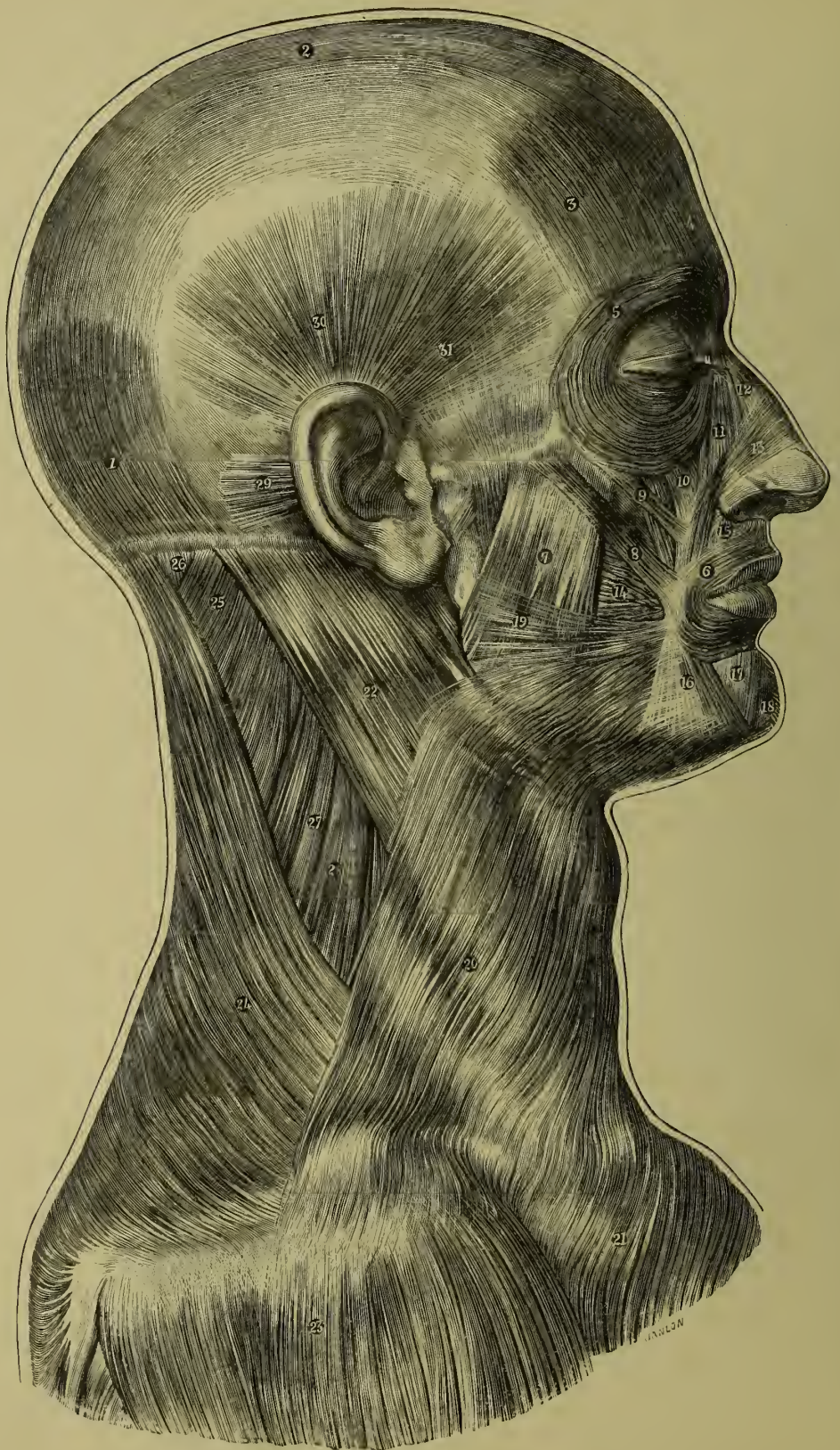


PLATE XX.

MUSCLES.

1. Occipital portion of occipito-frontalis.
 2. Tendinous aponeurosis.
 3. Frontal portion.—*Insertion*: behind from superior curved line of occipital bone, and from mastoid portion of temporal. *Origin*: from skin of forehead continuous with pyramidalis and corrugator supercilii muscles.
 4. Frontal insertion.
 5. Orbicularis Palpebrarum.—*Origin* and *insertion*: from internal angular process of frontal bone, and nasal process of superior maxilla and tendopalpebrarum.
 6. Orbicularis Oris.—Surrounds mouth, and blends with buccinator.
 7. Masseter.—*Origin*: from malar process of superior maxilla and zygomatic arch. *Insertion*: upper half of ramus of jaw and coronoid process.
 8. Zygomaticus Major.—*Origin*: outer surface of malar bone. *Insertion*: into the angle of the mouth.
 9. Zygomaticus Minor.—*Origin*: malar bone. *Insertion*: blends with levator labii superioris.
 10. Levator Labii Superioris Proprius.—*Origin*: lower margin of orbit. *Insertion*: into muscle of upper lip.
 11. Levator Labii Superioris Alæque Nasi.—*Origin*: nasal process of superior maxilla. *Inserted* into the side of nose and upper lip.
 12. Pyramidalis Nasi.—*Origin*: in occipito-frontalis. *Insertion*: blends with compressor nasi.
 13. Compressor Nasi.—*Origin*: from superior maxilla. *Insertion*: into fibro-cartilage of nose, and blends with its fellow.
 14. Buccinator.—*Origin*: from outer surfaces of alveolar processes of upper and lower jaws, and from pterygo-maxillary ligament. *Insertion*: into the angle of the mouth.
 15. Depressor Alæ Nasi.—*Origin*: from incisive fossa of superior maxilla. *Insertion*: into septum and the ala of nose.
 16. Depressor Anguli Oris (or Triangularis Menti).—*Origin*: from oblique line of lower jaw. *Insertion*: into the angle of the mouth.
 17. Depressor Labii Inferioris (or Quadratus Menti).—*Origin*: oblique line of lower jaw. *Insertion*: integument of the lower lip.
- For all the above, see Plate I.
18. Levator Labii Inferioris (or Levator Menti).—*Origin*: incisive fossa of lower jaw. *Insertion*: into the integument of chin.—See Plate I.
 19. Risorius.—*Origin*: in the fascia over masseter. *Insertion*: angle of mouth.
 20. Platysma Myoides.—*Origin*: from the clavicle and acromion process and fascia over pectoral, deltoid, and trapezius muscles. *Insertion*: lower jaw beneath exterior oblique line.
 21. Pectoral fibres of Platysma.
 22. Sterno-Mastoid.—*Origin*: by two heads from the sternum and clavicle. *Insertion*: into outer surface of mastoid process of temporal and superior curved line of occipital.
 23. Deltoid.—*Origin*: from outer third of anterior border and upper surface of the clavicle, and the whole of the lower border of spine of scapula. *Insertion*: into the middle of the outer side of the humerus.
 24. Trapezius.—*Origin*: inner third of superior curved line of occipital ligamentum nuchæ, the spinous processes of the 7th cervical, and all the dorsal vertebræ and supra-spinous ligament. *Insertion*: into the outer third of posterior border of clavicle, the upper margin of acromion, and the whole length of the upper border of the spine of scapula.—See Plate IV.
 25. Splenius Colli.—*Origin*: one of the portions of splenius. *Insertion*: into the posterior tubercles of the transverse processes of the 3rd or 4th upper cervical vertebræ.—See Plate IVA. i.
 26. Complexus.—*Origin*: by series of tendons from the tips of the transverse processes of the upper 7 dorsal and the 7th cervical. *Insertion*: into the depression between the two curved lines of the occipital.—See Plate IVA. i.
 27. Levator Anguli Scapulæ.—*Origin*: from the posterior tubercles of the transverse processes of the 3rd or 4th upper cervical vertebræ. *Insertion*: posterior border of scapula, between superior angle and the triangular smooth surface at the root of the spine.—See Plate IVA. i.
 28. Scalenus Posticus.—*Origin*: outer surface of second rib. *Insertion*: posterior tubercles of transverse processes of the lower 3rd or 4th cervical vertebræ.—See Plate IVA. iii.
 29. Retrahens Aurem.
 30. Attollens Aurem.
 31. Attrahens Aurem.

PLATE XXI.

MUSCLES.

1. Temporal Muscle.—*Origin*: from temporal fossa, and from the curved line on the temporal and parietal bones, and from temporal fascia. *Insertion*: into the coronoid process of lower jaw.
2. Corrugator Supercilii.—*Origin*: inner extremity of superciliary ridge. *Insertion*: into under surface of orbicularis.
3. Pyramidalis Nasi.—See Plate XX. 12.
4. Levator Labii Superioris Alæque Nasi.—See Plate I.; XX. 11.
5. Compressor Nasi.—For *origin* and *insertion*, see Plate XX. 13.
6. Levator Labii Superioris Proprius.—For *origin* and *insertion*, see Plate XX. 10.
7. Levator Anguli Oris.—*Origin*: from canine fossa. *Insertion*: into angle of the mouth.
8. Depressor Alæ Nasi.—See Plate XX. 15.
9. Orbicularis Oris.—For *origin* and *insertion*, see Plate XX. 6.
10. Buccinator.—For *origin* and *insertion*, see Plate XX. 14.
11. Depressor Labii Inferioris.—See Plate XX. 17.
12. Levator Menti (or Levator Labii Inferioris).—See Plate XX. 18.
13. Digastric.—Consists of two bellies. *Posterior belly* arises from fossa on the mastoid process, and passes downwards, forwards and inwards. *Anterior belly* is reflected upwards and forwards, and is inserted into a depression on the inner side of the lower border of the jaw; these two bellies are united by a tendon which is bound down to the hyoid bone.
14. Mylo-Hyoid.—*Origin*: Mylo-hyoid ridge of lower jaw. *Insertion*: into the hyoid bone.—See Plate III. iv.

15. Hyo-Glossus.—*Origin*: from body, lesser cornu and whole of great cornu of hyoid bone. *Insertion*: into the side of the tongue.

15A. Stylo-Hyoid.—*Origin*: middle of outer surface of styloid process. *Insertion*: body of hyoid.

16. Thyro-Hyoid.—*Origin*: oblique line of the thyroid. *Insertion*: lower part of body and great cornu of hyoid.

17. Anterior belly of omo-hyoid.

18. Sterno-Hyoid.—*Origin*: inner end of clavicle, upper and inner parts of sternum. *Insertion*: into lower border of hyoid.

19. Sterno-Mastoid.—For *origin* and *insertion*, see Plate XX. 22.

20. Trapezius.—For *origin* and *insertion*, see Plate XX. 24.

21. Complexus.—For *origin* and *insertion*, see Plate XX. 26.

22. Splenius. *Origin*: from lower half of ligamentum nuchæ; from spinous processes of the last cervical, and the upper dorsal vertebræ, and divides into two, viz., splenius capitis and colli.

23. Levator Anguli Scapulæ.—For *origin* and *insertion*, see Plate IVA. i.; XV. iii.; XX. 27.

24. Scalenus Medius.—*Origin*: from upper surface of 1st rib. *Insertion*: into the posterior tubercles of the transverse processes of lower six cervical vertebræ.—See Plate IVA. iii.

25. Scalenus Anticus.—*Origin*: tubercle on the upper part of 1st rib. *Insertion*: into the outer tubercles of the transverse processes of 3rd, 4th, 5th, and 6th cervical vertebræ.—See Plate IVA. iii.

26. Deltoid.—For *origin* and *insertion*, see Plate XX. 23.

27. Clavicular fibres of pectoralis major.

28. Posterior belly of omo-hyoid.

PLATE XXI.—HEAD AND NECK, SECOND LAYER.

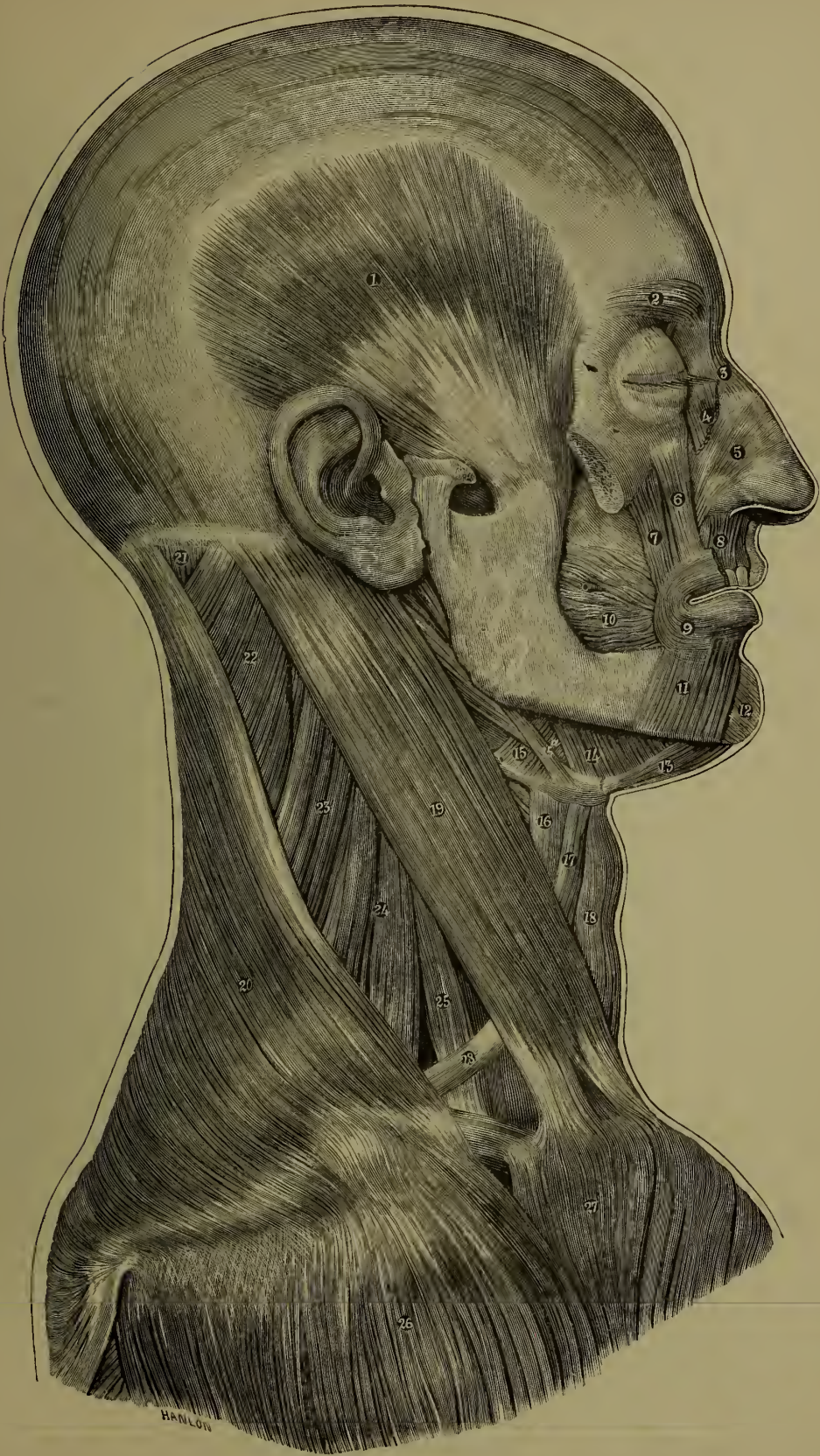


PLATE XXII.—ARM-PIT.



PLATE XXII.

- | | |
|---|---|
| <p>1. Biceps. For <i>origin</i> and <i>insertion</i>, see Plate XXIII. i. 6.</p> <p>2. Coraco Brachialis.—For <i>origin</i> and <i>insertion</i>, see Plate XXIII. i. 2.</p> <p>3. Pectoralis Major.—For <i>origin</i> and <i>insertion</i>, see Plate XXIX. 5.</p> <p>4. Pectoralis Minor.—For <i>origin</i> and <i>insertion</i>, see Plate XXXI. 1.</p> <p>5. Serratus Magnus.—For <i>origin</i> and <i>insertion</i>, see Plate XXIX. 12.</p> <p>6. Latissimus Dorsi.—For <i>origin</i> and <i>insertion</i>, see Plate XXXI. 15.</p> | <p>7. Tendon of Latissimus Dorsi.</p> <p>8. Teres Major.—For <i>origin</i> and <i>insertion</i>, see Plate XXX. 14.</p> <p>9. Edge of Posterior Head of Deltoid.</p> <p>10. Subscapularis.—<i>Origin</i>: the whole of the under surface of the scapula. <i>Insertion</i>: into the lesser tuberosity of the humerus.</p> <p>11. Long Head of Triceps.</p> <p>12. Brachialis Anticus.—For <i>origin</i> and <i>insertion</i>, see Plate XXIII. i. 7.</p> <p>13. Intercostal Muscle.</p> |
|---|---|

PLATE XXIII.

FIG. I.

BONES.

- A. Clavicle. } See Plate XV. i. ii. iii. iv.
B. Scapula. }

MUSCLES.

1. Deltoid.—*Origin*: from outer third of anterior border of upper surface of clavicle, from outer margin and upper surface of acromion, and from whole length of lower border of the spine of scapula. *Insertion*: into a rough surface on the middle of the outer side of the shaft of humerus.

2. Coraco-Brachialis.—*Origin*: from apex of coracoid process. *Insertion*: into the middle of the inner side of shaft of humerus

3. Short Head of *Biceps*.

4. Cut portion of Pectoralis Major.

5. Tendon of Deltoid.

6. *Biceps*.—*Origin*: by two heads. Short head from apex of coracoid process. Long head from the upper margin of glenoid cavity. *Insertion*: into the back part of the tuberosity of radius.

7 and 8. Brachialis Anticus.—*Origin*: from the lower half of the outer and inner surface of the humerus. *Insertion*: into the coronoid process of ulna.

9. Tendon of *Biceps*.

10. Bicipital Fascia.

11. Supinator Radii Longus.—*Origin*: from lower two-thirds of exterior condyloid ridge of humerus. *Insertion*: into the base of the styloid process of radius.

FIG. II.

BONES.

- A. Clavicle.
B. Acromial end of Clavicle.
C. Coraco-acromial Ligament.
D. Great Tuberosity of Humerus.
E. Scapula.
F. Radius.

MUSCLES.

1. Tendon of Pectoralis Minor, cut.—See Plate XXXI.

2. Coraco-Brachialis.—For *origin* and *insertion*, see above, Fig. i.

3. Short Head of *Biceps*.

4. Long Head of *Biceps*.

5. Body of *Biceps*.—For *origin* and *insertion*, see above, Fig. i.

6. Tendon of Deltoid, cut.

7, 7A. Brachialis Anticus.

8. Supinator Radii Longus, cut. For *origin* and *insertion*, see above, Fig. i.

9. Flexor Profundus Digitorum.

10. Insertion of Brachialis Anticus.

FIG. III.

BONES.

- A. Clavicle.
B. Coraco-clavicular Ligament.
C. Scapula.
D. Shaft of Humerus.
E. Radius.
F. Ulna.

MUSCLES.

1. Tendon of Pectoralis Minor.

2. Coraco-Brachialis.—For *origin* and *insertion*, see above, Fig. i.

2A. Insertion of Coraco-Brachialis.

3. Short Tendon of *Biceps*, cut.

3A. Long Tendon of *Biceps*, cut.

4. Subscapularis.—*Origin*: from the whole of the under surface of the scapular. *Insertion*: into the lesser tuberosity of humerus.

5. Tendon of Deltoid, cut.

6. Internal Head of Triceps.

7. Brachialis Anticus.

7A. Insertion of Brachialis Anticus.

PLATE XXIII.—UPPER ARM, FRONT VIEW.



Fig. i.



Fig. ii.

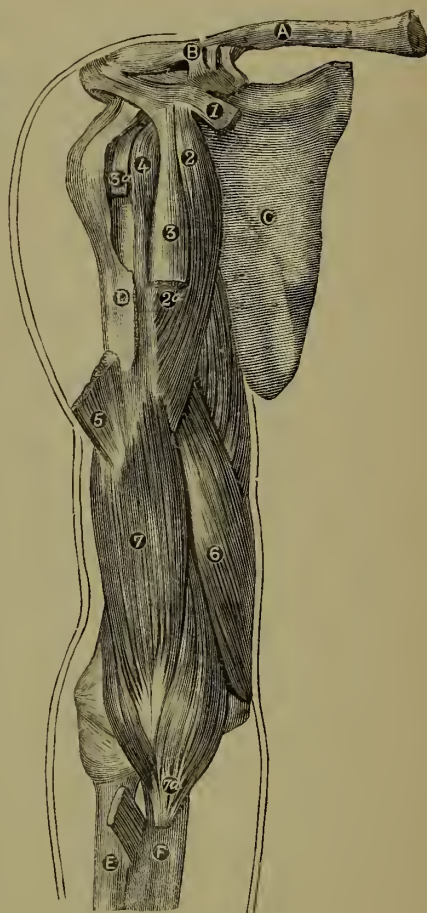


Fig. iii.

PLATE XXIV.—UPPER ARM, BACK VIEW.

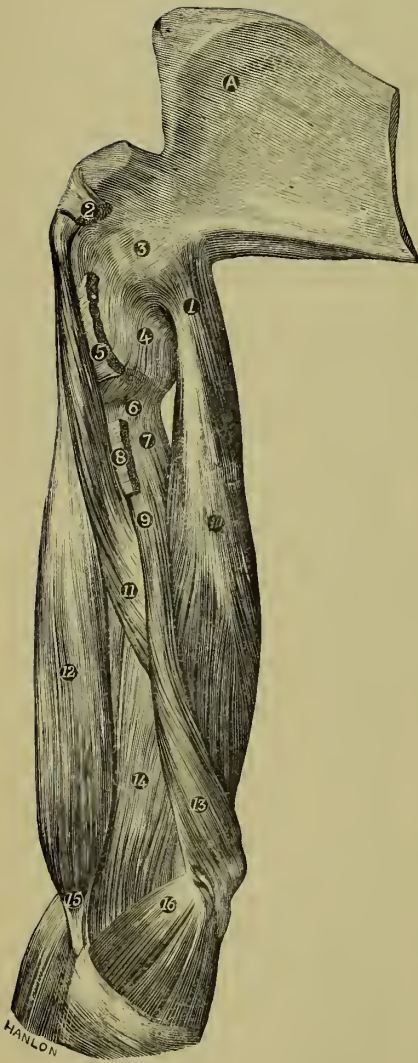


Fig. i.



Fig. ii.

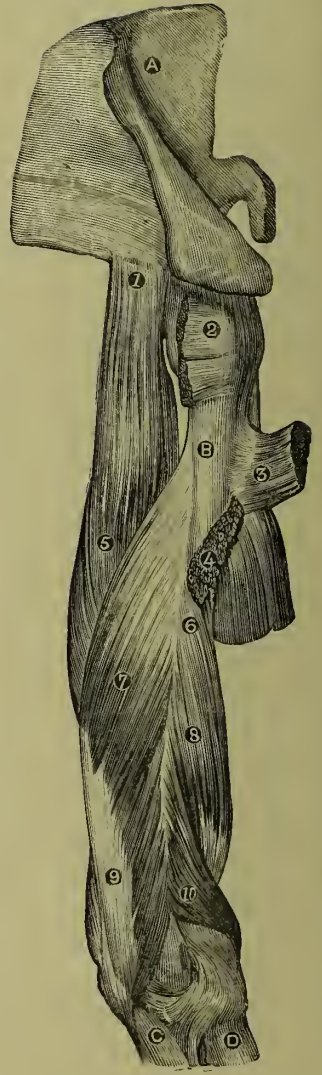


Fig. iii.

PLATE XXIV.

FIG. I. BONES.

A. Scapula.—See Plate XV. iii. iv.

MUSCLES.

1. Long Head of Triceps.
2. Cut Tendon of Pectoralis Minor.—See Plate XXXI.
3. Capsular Ligament.
4. Lesser Tuberosity of Humerus.
5. Cut portion of Subscapularis.
6. Outer Head of Triceps; 7, its Tendon.
8. Tendon of Teres Major and of Pectoralis Major.
9. Inner Head of Triceps.
10. Body of Triceps.
11. Coraco-Brachialis.
12. Biceps.
13. Lower end of Inner Head of Triceps.

Triceps.—*Origin*: by three heads. *Long head*

(1) arises from lower part of glenoid cavity and from the adjoining rough portion of the inferior costa of the scapula; the muscular fibres pass down between those of the other two heads and end in the common tendon.

Outer head (6, 7) arises by tendinous and fleshy fibres from the humerus immediately below the great tuberosity and from the ridge above the external condyle and external intermuscular septum; the fibres end in the common tendon.

Inner head (9) arises from humerus just below teres major from intermuscular septum and posterior surface of humerus; the three heads end in a common tendon which is *inserted* into the olecranon process of ulna.

14. Brachialis Anticus.—See Plate XXIII. ii. 7.
15. Tendon of Biceps.
16. Pronator Radii Teres.—See Plate XXVI. 10.

FIG. II. BONES.

- A. Scapula.—See Plate XV. iii. iv.
- B. Ulna.—See Plate XVII. i. ii.

MUSCLES.

1. Coraco-Brachialis.
2. Brachialis Anticus.—See Plate XXIII. i. 7.
3. Inner Head of Triceps.—See above, Fig. i.
4. Insertion of Brachialis Anticus.
5. Tendon of Biceps, cut.

FIG. III. BONES.

- A. Supra-spinatus Fossa of Scapula.—See Plate XXXIV. 6.
- B. Shaft of Humerus.
- C. Ulna.
- D. Radius.

MUSCLES.

1. Long Head of Triceps.—See above, Fig. i.
2. Tendon of Infra-spinatus (see Plate XXXII. 12) and of Teres Minor.
3. Tendon of Pectoralis Major.
4. Tendon of Deltoid.
5. Body of Triceps.
6. Origin of Brachialis Anticus.—See Plate XXIII. i. 7.
7. Outer Head of Triceps.—See above, Fig. i.
8. Body of Brachialis Anticus.—See Plate XXIII. i. 7.
9. Tendon of Insertion of Triceps.—See above, Fig. i.
10. Inferior external head of Brachialis Anticus.—See Plate XXIII. i. 7.

PLATE XXV.

FIG. 1.

1. Tendon of Triceps.
2. Outer edge of Brachialis Anticus
3. Supinator Longus.—For *origin* and *insertion*, see Plate XXIII. i. 11.
4. Extensor Carpi Radialis Longior.—*Origin*: from lower third of external condyloid ridge of humerus. *Insertion*: into base of metacarpal bone of index-finger.
5. Extensor Carpi Radialis Brevior.—*Origin*: from external condyle of humerus. *Inserted* into base of metacarpal bone of middle finger.
6. Extensor Communis Digitorum.—*Origin*: from external condyle of humerus and deep fascia. *Insertion*: by three tendons into the bases of the last phalanges of the three outer fingers.
7. Anconeus.—*Origin*: from the back part of the outer condyle of humerus. *Insertion*: into olecranon and upper third of the posterior border of ulna.
8. Extensor Minimi Digiti.—*Origin*: from common extensor tendon. *Inserted* into the second and third phalanges of little finger.
9. Extensor Carpi Ulnaris.—*Origin*: from external condyle of humerus, from common tendon, from middle third of posterior border of ulna and fascia of fore-arm. *Inserted* into the base of the metacarpal bone of little finger.
10. Flexor Digitorum Profundus.—For *origin* and *insertion*, see Plate XXVI. i. 5.
11. Flexor Carpi Ulnaris, fascia cut.—See below, Fig. ii. 10.
12. Annular Ligament.
13. Extensor Ossis Metacarpi Pollicis, or Long Adductor of the Thumb.—*Origin*: from posterior surface of the shaft of ulna, interosseous ligament, and from middle third of the posterior surface of the shaft of radius. *Insertion*: base of metacarpal bone of thumb.

14. Extensor Primi Internodii Pollicis, or Short Extensor of the Thumb.—*Origin*: from posterior surface of shaft of radius and interosseous membrane. *Insertion*: into base of first phalanx of thumb.

FIG. II.

- 1 and 2. Brachialis Anticus.
3. Origin of (4) Extensor Carpi Radialis Longior.
5. Extensor Carpi Radialis Brevior.—For *origin* and *insertion*, see above, Fig. i.
6. Extensor Ossis Metacarpi Pollicis.—For *origin* and *insertion*, see above, Fig. i.
7. Extensor Primi Internodii Pollicis.—For *origin* and *insertion*, see above, Fig. i.
8. Extensor Secundi Internodii Pollicis.—*Origin*: from posterior surface of the shaft of ulna and interosseous membrane. *Insertion*: into base of last phalanx of thumb.
9. Extensor Indicis.—*Origin*: from posterior surface of the shaft of ulna below extensor secundi, and from the interosseous membrane. *Insertion*: into the second and third phalanges of index-finger.
10. Flexor Carpi Ulnaris.—*Origin*: by two heads, one head from inner condyle of humerus, the other from inner margin of olecranon and from the upper two-thirds of posterior border of the ulna. *Insertion*: into pisiform bone and base of metacarpal bone of little finger.
11. Its origin.
12. Flexor Digitorum Profundus (ulnar origin).
- 13 and 14. Abductor Indicis, or First Dorsal Interosseous Muscle.—For *origin* and *insertion*, see Plate XXVII. 13, 14.
- 15 and 16. } Dorsal Interosseous Muscles.
- 17 and 19. }
- 18 and 20. }

PLATE XXV.—FORE-ARM AND HAND, BACK VIEW.



Fig. i.



Fig. ii.

PLATE XXVI.—FORE-ARM AND HAND, FRONT VIEW.



Fig. 1.

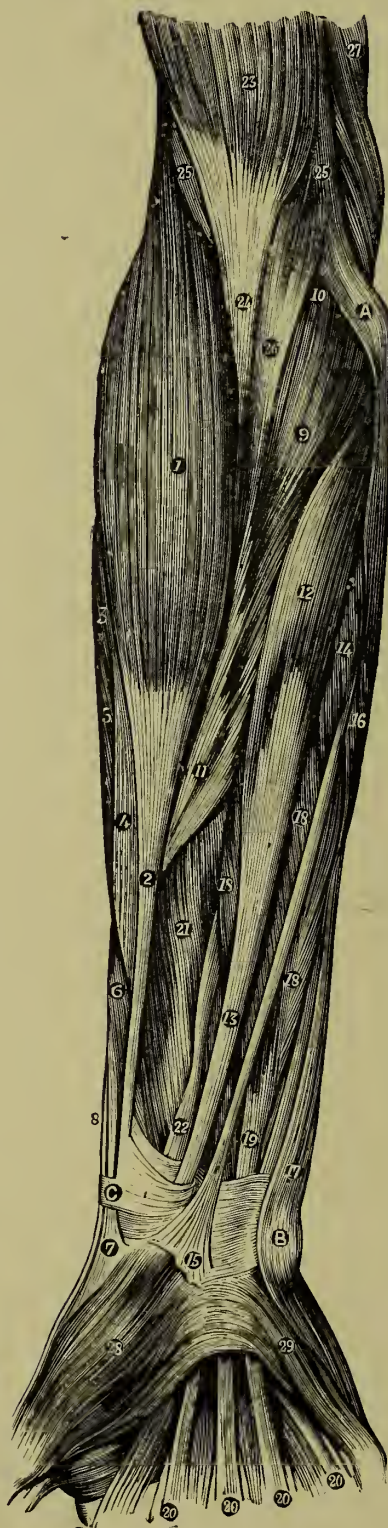


Fig. IV.



Fig. ii.

PLATE XXVI.

FIGS. I., II. AND III.

BONES.

A. Humerus.

MUSCLES.

1. Cut Tendon of Biceps.
2. Flexor Digitorum Sublimis.—*Origin*: by three heads—one from internal condyle of humerus and internal lateral ligament, *second head* from inner side of coronoid process, *third head* from oblique line on radius. *Insertion*: by four tendons into sides of the second phalanges.
3. Condylar origin of Flexor Sublimis Digitorum.
4. Its radial origin.
5. Origin of Flexor Digitorum Profundus.—*Origin*: from upper two-thirds of the anterior and inner surface of the shaft of the ulna, also from a depression on the inner side of the coronoid process, upper two-thirds of posterior border of ulna and interosseous membrane. *Insertion*: into the bases of the last phalanges of the fingers on their dorsal aspect.
6. Extensor Carpi Radialis Longior.
7. Flexor Longus Pollicis.—*Origin*: from anterior surface of radius below oblique line, and from interosseous membrane. *Insertion*: base of last phalanx of thumb.
8. Pronator Quadratus.—*Origin*: from lower fourth of anterior surface of radius. *Insertion*: by fibres which pass, some transversely and some obliquely, to the corresponding part of the Radius.
9. Supinator Brevis.—*Origin*: external condyle of humerus, external lateral ligament, and orbicular ligament, oblique ridge on ulna and depression in front of it. *Insertion*: surrounds upper part of radius, and is attached to the back part of inner surface.
10. Pronator Radii Teres.—*Origin*: by two heads—first from humerus just above internal condyle, second from inner side of coronoid process. *Insertion*: into the middle of outer side of the shaft of radius.
11. Its radial attachment.
12. Flexor Profundus Digitorum.—*For origin and insertion*, see above.
13. Ulnar origin of Flexor Profundus Digitorum.
14. Interosseous Membrane.
15. Adductor Pollicis.—*Origin*: whole length of metacarpal bone of middle finger on its palmar surface. *Insertion*: ulnar side of base of first phalanx of thumb.
16. Palmar Interosseous Muscles.

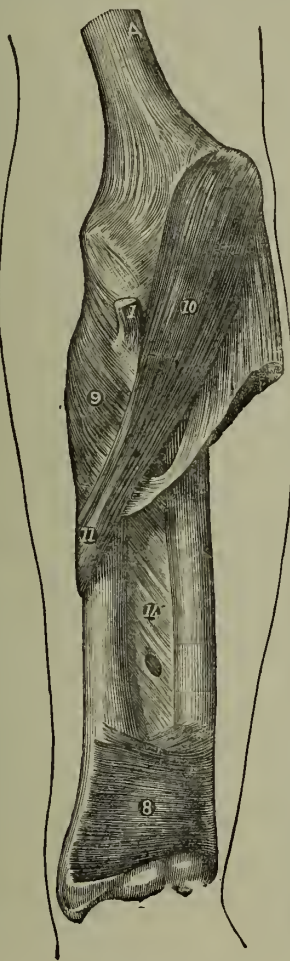


Fig. iii.

FIG. IV.

BONES.

- A. Internal Condyle of Humerus.
- B. Inferior extremity of the Ulna.
- C. Inferior extremity of the Radius.

MUSCLES.

1. The Supinator Radii Longus.—*For origin and insertion*, see Plate XXIII. i. 11. About the middle of the fore-arm the muscle terminates in a flat tendon, which runs along the outer border of the radius to its insertion.
2. Its tendon.
- 3 and 4. Extensor Carpi Radialis Longior.—*For origin and insertion*, see Plate XXV. i. 4.
5. Extensor Carpi Radialis Brevior.—*For origin and insertion*, see Plate XXV. i. 5.
6. Extensor Ossis Metacarpi Pollicis.—*For origin and insertion*, see Plate XXV. i. 13; sometimes named Abductor Longus Pollicis.
7. Its Tendon, which passes through a groove in the lower end of the radius.
8. Extensor Primi Internodii Pollicis.—*For origin and insertion*, see Plate XXV. i. 14; sometimes named Extensor Brevis Pollicis.
9. Pronator Radii Teres.—*For origin and insertion*, see above, Fig. iii. 10.
10. Its origin from the humerus.
11. Its insertion by a flat tendon to the rough surface of the radius.
12. Flexor Carpi Radialis.—*Origin*: from the internal condyle of the humerus by a tendon common to it and the pronator teres, palmaris longus, flexor carpi ulnaris, and flexor sublimis, and from the fascia of the fore-arm and from the intermuscular septa that separate it from these muscles. *Insertion*: into the second metacarpal bone.
13. Its Tendon, growing narrower as it descends.
14. Palmaris Longus.—*Origin*: from the internal condyle by the common tendon and from the fascia and intermuscular septa of the fore-arm. *Insertion*: by a long thin tendon to the palmar fascia.
15. Its Tendon.
- 16 and 17. Extensor Carpi Ulnaris.—*For origin and insertion*, see Plate XXV. i. 9.
18. Flexor Digitorum Sublimis.—*For origin and insertion*, see above, Fig. ii. 2.
- 19 and 20. Its tendons.
- 21 and 22. Flexor Longus Pollicis.—*For origin and insertion*, see above, Fig. i. 7.
23. Biceps Flexor.—*For origin and insertion*, see Plate XXIII. i. 6.
24. Its Tendon.
25. Brachialis Anticus.—*For origin and insertion*, see Plate XXIII. i. 7.
26. Its Tendon.
27. Triceps.—*For origin and insertion*, see Plate XXIV. i. 13.
28. Muscles forming the ball of the thumb.
29. Muscles of the little finger.

PLATE XXVII.

FIGS. I AND II.

1. Extensor Ossis Metacarpi Pollicis.—For *origin* and *insertion*, see Plate XXV. i.
2. Its tendinous insertion.
3. Extensor Primi Internodii Pollicis.—For *origin* and *insertion*, see Plate XXV. i. 4.
4. Its insertion.
5. Extensor Secundi Internodii Pollicis.—For *origin* and *insertion*, see Plate XXV. ii. 8.
6. Its tendinous insertion.
7. Extensor Carpi Radialis Longior.—For *origin* and *insertion*, see Plate XXV. i. 5.
8. Its insertion.
9. Tendon of Supinator Radii Longus.—*Origin* : upper two-thirds of external condyloid ridge. *Insertion* : base of styloid process of radius.
10. Tendon of Extensor Secundi Internodii Pollicis.
11. Adductor Pollicis.—For *origin* and *insertion*, see Plate XXVI. 15.
12. Tendinous expansion of above, spreading into the tendon or the long extensor of the thumb. See 10, above.
- 13 and 14. First Dorsal Interosseous or Abductor

Indicis.—*Origin* : by two heads—*outer*, from ulnar border of first metacarpal bone ; *inner*, radial border of second metacarpal bone. *Insertion* : radial side of index-finger.

15. Extensor Indicis.—For *origin* and *insertion*, see Plate XXV. ii. 9.

16. Dorsal Interosseous.—*Origin* : side of metacarpal bone. *Insertion* : base of first phalanx.

17. Lumbrical Muscle.—*Origin* : from tendon of deep flexor. *Insertion* : into tendon of common extensor.

18 and 19. Their insertions.

FIG. III.

Cut tendons of the flexor sublimis, showing its perforation for the passage of the flexor profundus and their insertions.

FIG. IV.

The tendon of the flexor sublimis seen in front.

FIG. V.

The tendon of the flexor profundus seen in front.

FIGS. VI. AND VII.

The same tendons, side view.

PLATE XXVII.—WRIST AND HAND.



Fig. iii.

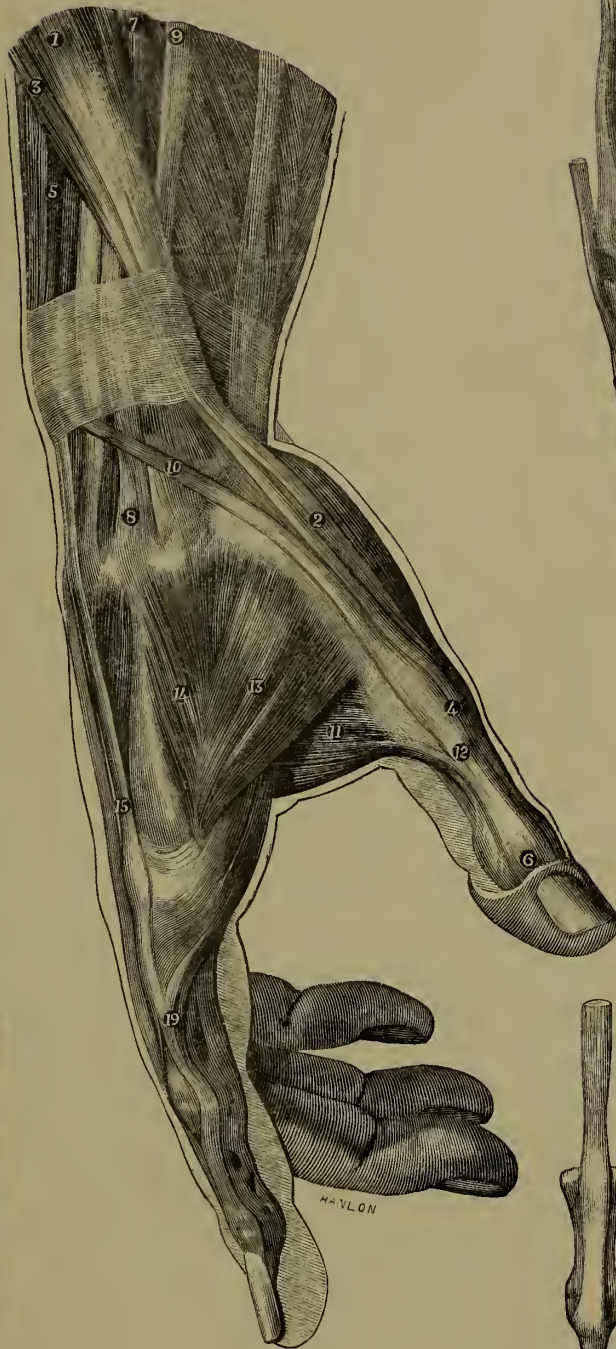


Fig. i.



Fig. ii.



Fig. vi.



Fig. vii.



Fig. v.



Fig. iv.

PLATE XXVIII.—HAND, BACK AND FRONT.

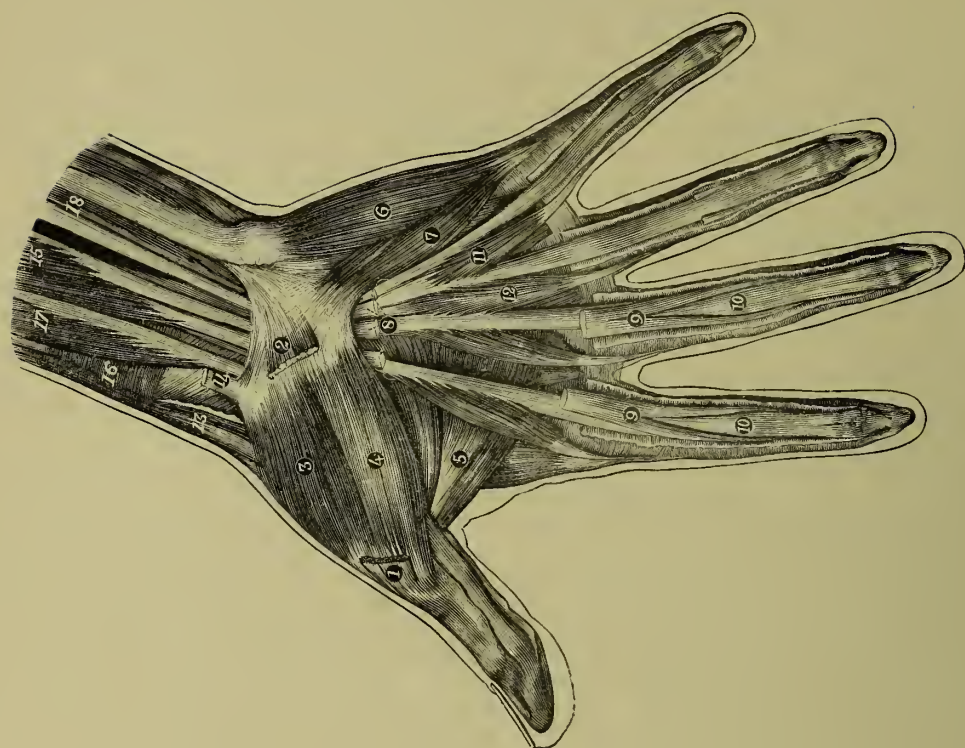


Fig. ii.

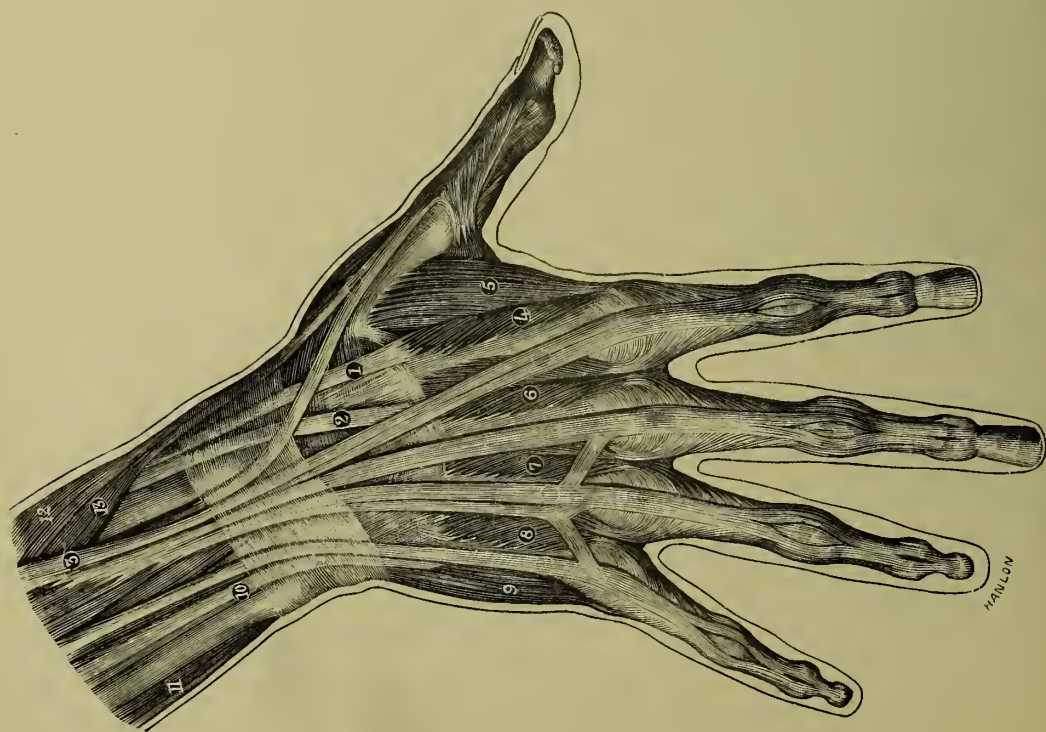


Fig. i.

PLATE XXVIII.

FIG. I.

1. Insertion of Extensor Carpi Radialis Longior.—For *origin* and *insertion*, see Plate XXV. i. 4.
2. Insertion of Extensor Carpi Radialis Brevior.—For *origin* and *insertion*, see Plate XXV. i. 5.
3. Extensor Indicis.—For *origin* and *insertion*, see Plate XXV. ii. 9.
- 4 and 5. First Dorsal Interosseous.—For *origin* and *insertion*, see Plate XXVII. 13, 14.
6. Second Dorsal Interosseous.
7. Third Dorsal Interosseous.
8. Fourth Dorsal Interosseous.
9. Abductor Minimi Digiti.—*Origin*: pisiform bone, and tendon flexor carpi ulnaris. *Insertion*: ulnar side of base of first phalanx.
10. Tendon of Extensor Minimi Digiti.
11. Extensor Carpi Ulnaris.—For *origin* and *insertion*, see Plate XXV. i. 9.
12. Tendon of Extensor Ossis Metacarpi Pollicis.
13. Tendon of Extensor Primi Internodii Pollicis.

FIG. II.

- 1 and 2. Abductor Pollicis, cut.—*Origin*: ridge of trapezium and annular ligament. *Insertion*: base of first phalanx of thumb.
3. Opponens Pollicis.—*Origin*: trapezium and annular ligament. *Insertion*: whole of metacarpal bone of thumb.

4. Flexor Brevis Pollicis.—*Origin*: by two heads—*superficial*, from trapezium and annular ligament; *deep*, from trapezoid, os magnum and base of third metacarpal bone and sheath of flexor carpi radialis. *Insertion*: outside of superior end of first phalanx of thumb.

5. Adductor Pollicis.—For *origin* and *insertion*, see Plate XXVI. 15.

6. Abductor Minimi Digiti.—For *origin* and *insertion*, see above, Fig. i.

7. Flexor Brevis Minimi Digiti.—*Origin*: unciform bone and annular ligament. *Insertion*: base of first phalanx of little finger.

8 and 9. Cut tendons of Flexor Sublimis Digitorum.

10. Tendons of Flexor Profundus Digitorum.

11 and 12. Lumbricales.—For *origin* and *insertion*, see Plate XXVII. ii. 17.

13. Tendon of Extensor Ossis Metacarpi Pollicis.

14. Tendon of Flexor Carpi Radialis.—*Origin*: inner condyle of humerus. *Insertion*: base of metacarpal of index-finger.

15. Tendon of Flexor Digitorum Sublimis.

16. Pronator Quadratus.

17. Tendon of Flexor Longus Pollicis.—For *origin* and *insertion*, see Plate XXVI. 7.

18. Flexor Digitorum Profundus.

PLATE XXIX.

1. Sternal end of Collar-bone.
2. Lower end of Sternum.
3. Linea Alba.
4. Its attachment at Pubes.
5. Pectoralis Major.—*Origin* : sternal half of anterior border of clavicle, half breadth of sternum, cartilages of first six ribs and bony part of sixth, and aponeurosis of external oblique. *Insertion* : outer lip of bicipital groove.
6. Clavicular fibres of Pectoralis Major.
7. Deltoid.—For *origin* and *insertion*, see Plate XXIII. i. 1.
8. Triceps.—For *origin* and *insertion*, see Plate XXIV. i.
9. Brachialis Anticus.—See Plate XXIII. i. 7.
10. Biceps.—See Plate XXIII. i. 6.
11. Latissimus Dorsi.—For *origin* and *insertion*, see Plate XXXI.
12. Serratus Magnus.—*Origin* : by nine digitations from first eight ribs; two from the second rib. *Insertion* : into the posterior border of scapula.
13. Costal origin of Obliquus Externus.
14. Sterno-Hyoid.—For *origin* and *insertion*, see Plate XXI. 18.
15. Sterno-Mastoid.—For *origin* and *insertion*, see Plate XX. 21, 22.
16. Platysma Myoides.—For *origin* and *insertion*, see Plate XX. 20.
17. Quadratus Menti.—For *origin* and *insertion*, see Plate XX. 17.
18. Digastricus.

PLATE XXIX.—TRUNK, FRONT VIEW.



PLATE XXX.—TRUNK, FRONT VIEW, MIDDLE LAYER.

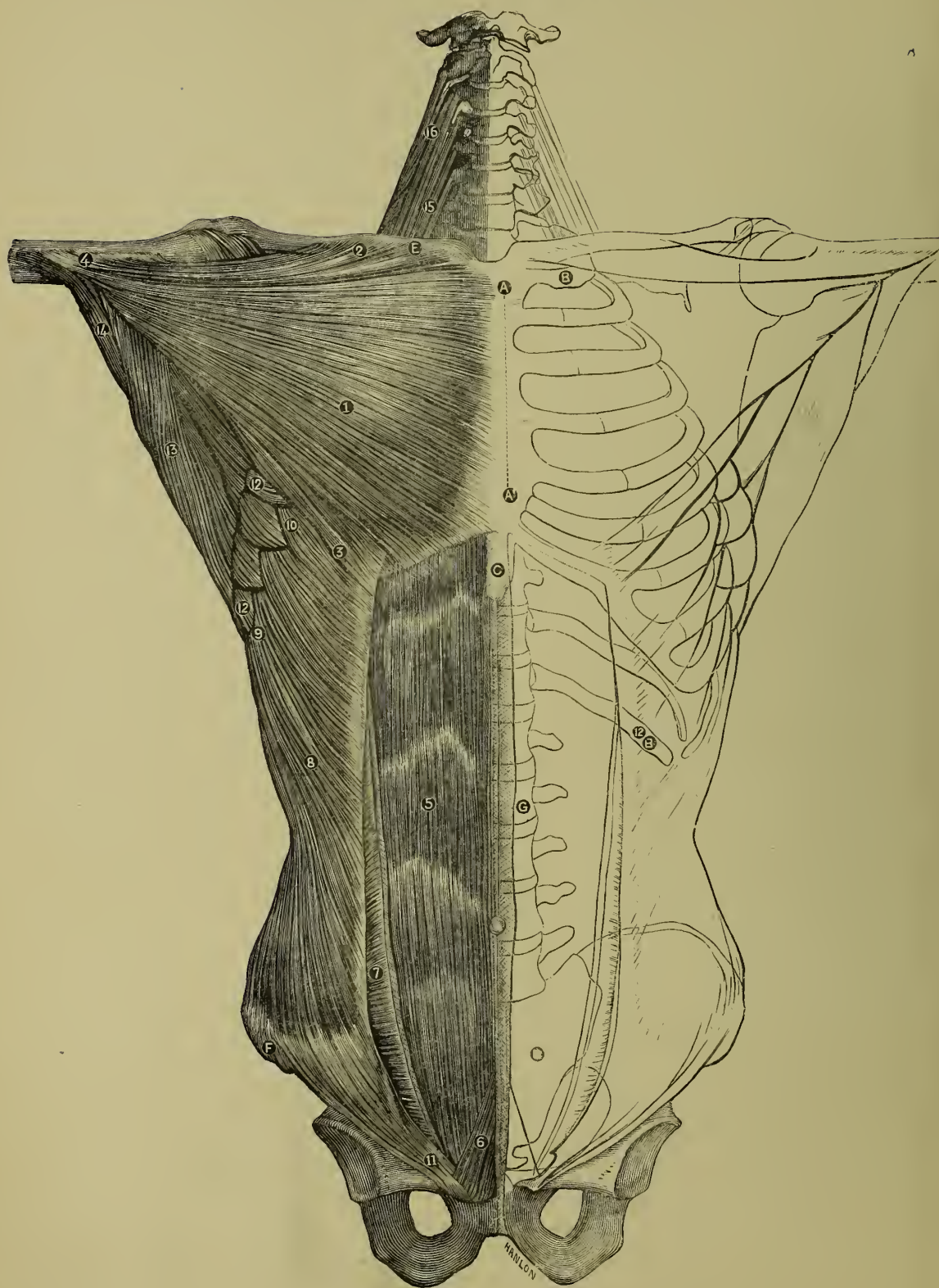


PLATE XXX.

BONES.

- A to A 1. The Sternum.
- B to B 12. The Ribs.
- C. The Ensiform or Xiphoid Cartilage.
- D. The Sacrum.
- E. The Clavicle.
- F. Crest of Ilium.

MUSCLES.

- 1. Pectoralis Major.—For *origin* and *insertion*, see Plate XXIX.
- 2. Its Clavicular origin.
- 3. Slip from Ribs.
- 4. Its insertion into Humerus.
- 5. Rectus Abdominis.—*Origin*: by two heads—*external* arises from crest of os pubis; *internal* from the symphysis pubis and ligaments. *Insertion*: into the cartilages of the fifth, sixth and seventh ribs.
- 6. Pyramidalis.—*Origin*: front of os pubis and anterior pubic ligament. *Insertion*: into the linea alba.
- 7. Obliquus Abdominis Internus.—See Plate XXI. 8.

8. Obliquus Abdominis Externus.—*Origin*: by digitations from eight lower ribs. *Insertion*: those fibres from lowest ribs are inserted into anterior half of outer tip of crest of the ilium; the middle and upper fibres end in an aponeurosis which join with that of the opposite side in the middle line, and form the linea alba, while the lowest fibres extend from anterior superior iliac spine to the spine of os pubis in the form of a broad band called Poupart's ligament.

- 9 and 10. Its interdigitating origin from Ribs.
- 11. Its insertion into the Os Pubis.
- 12. Serratus Magnus.—For *origin* and *insertion*, see Plate XXIX.
- 13. Latissimus Dorsi.—For *origin* and *insertion*, see Plate XXXI.
- 14. Teres Major.—*Origin*: dorsal aspect of inferior angle of scapula. *Insertion*: posterior bicipital ridge of humerus.
- 15. Scalenus Anticus.—For *origin* and *insertion*, see Plate XXI. 25.
- 16. Scalenus Medius.—For *origin* and *insertion*, see Plate XXI. 24.

PLATE XXXI.

BONES.

- A. Sternum.
- B. Xiphoid Cartilage.
- C. Clavicle.
- D. Sacrum.

MUSCLES.

1. Pectoralis Minor.—*Origin*: third, fourth and fifth ribs. *Insertion*: anterior border of coracoid process.
2. Its origin from the Ribs.
3. Costo-clavicular Ligament.
4. Subclavius.—*Origin*: cartilage of first rib. *Insertion*: middle third of clavicle.
5. Rectus Abdominis.—For *origin* and *insertion*, see Plate XXX. 5.
6. Its insertion into Ribs.
7. Its Pubic insertion.
8. Obliquus Abdominis Internus.—*Origin*: from outer half of Poupart's ligament, from anterior three-fourths of middle tip of the crest of ilium and lumbar fascia. *Insertion*: lower fibres are inserted together with transversalis into crest of os

pubis and pectineal line, middle fibres pass transversely and end in linea alba, while the most posterior fibres are inserted into cartilages of last four ribs.

9. Its insertion into Pubis.
10. Its insertion into Ribs.
11. Serratus Magnus.—For *origin* and *insertion*, see Plate XXIX.
12. Intercostales.
13. Subscapularis.—*Origin*: anterior surface of scapula. *Insertion*: lesser tuberosity of humerus.
14. Its insertion into tuberosity of Humerus.
15. Latissimus Dorsi.—*Origin*: from spinous processes of six inferior dorsal and those of lumbar and sacral vertebræ and supra-spinous ligament, from the posterior fifth of the outer tip of the crest of ilium. *Insertion*: into the bottom of the bicipital groove.
16. Its insertion into Humerus.
17. Insertion of Pectoralis Major.—See Plate XXIX.
18. Levator Anguli Scapulæ.—For *origin* and *insertion*, see Plate XX. 27.

PLATE XXXI.—TRUNK, FRONT VIEW, DEEP LAYER.

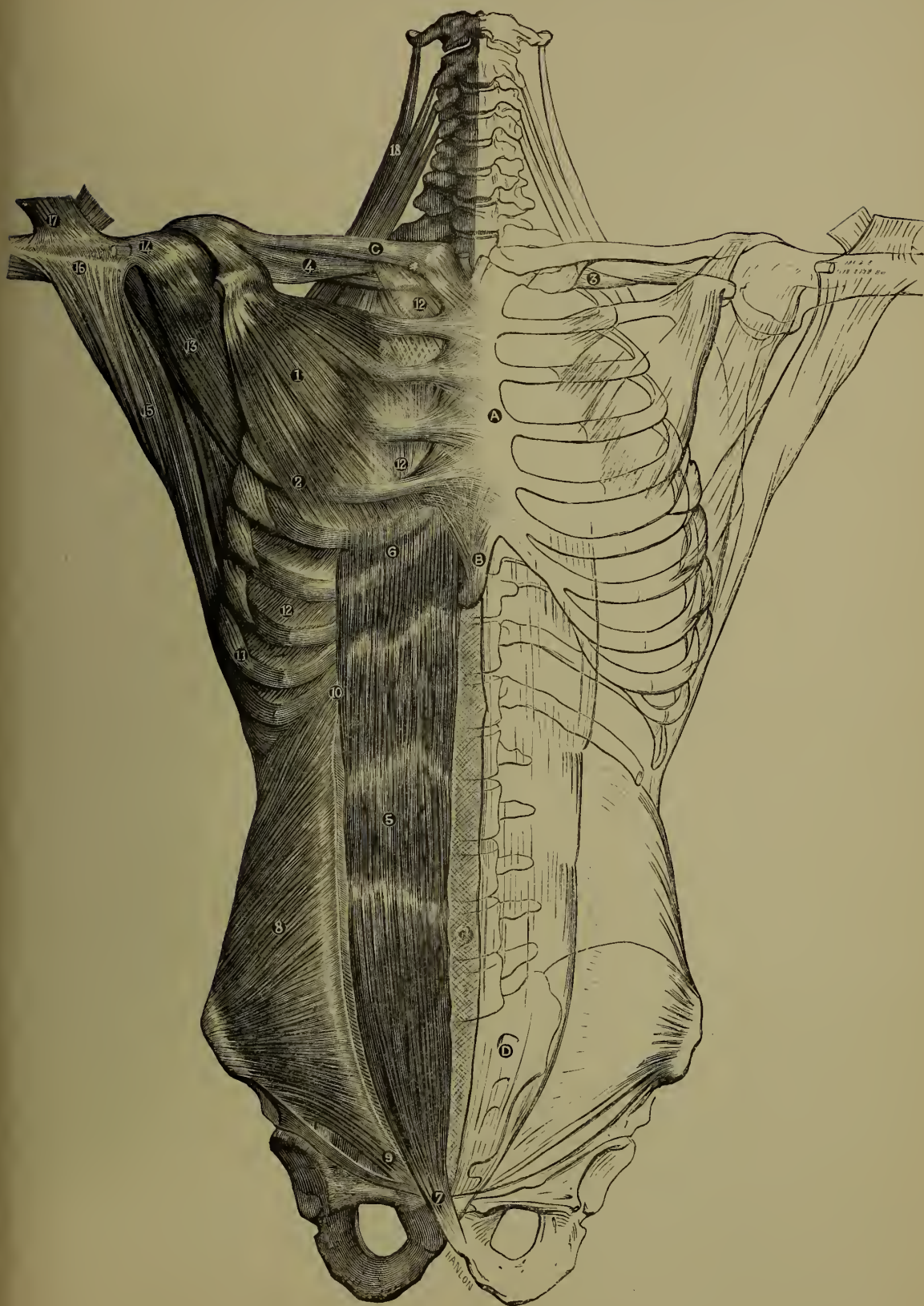


PLATE XXXII.—BACK, THREE-QUARTER VIEW.



PLATE XXXII.

1. Trapezius.—For *origin* and *insertion*, see Plate XX. 24.
2. Its origin at Occipital bone.
3. Its Scapular insertion.
4. Its Vertebral origin.
5. Deltoid.—For *origin* and *insertion*, see Plate XXIII.
6. Origin of Deltoid from Spine of Scapula.
7. Brachialis Anticus.—See Plate XXIII. i. 7.
8. Outer Head of Triceps.
9. Long Head of Triceps.
10. Pectoralis Major.—For *origin* and *insertion*, see Plate XXIX.
11. Pectoralis Minor.—For *origin* and *insertion*, see Plate XXXI.
12. Infra-Spinatus.—*Origin*: from infra-spinatus fossa of scapula. *Insertion*: middle facet on great tuberosity of humerus.
13. Teres Minor.—*Origin*: dorsal aspect of axillary border of scapula, its upper two-thirds. *Insertion*: lower facet on great tuberosity of humerus.
14. Teres Major.—For *origin* and *insertion*, see Plate XXX. 14.
15. Latissimus Dorsi.—For *origin* and *insertion*, see Plate XXXI.
16. Serratus Magnus.—For *origin* and *insertion*, see Plate XXIX.
17. Obliquus Abdominis Externus.—For *origin* and *insertion*, see Plate XXX. 8.
18. Lumbar Aponeurosis.
19. Posterior part of the Crest of Ilium.
20. Gluteus Medius.—*Origin*: outer surface of ilium between superior and inferior curved lines, from outer tip of crest. *Insertion*: into oblique line on great trochanter.
21. Gluteus Maximus.—*Origin*: superior curved line of the crest of ilium and portion of bone behind, back of sacrum and coccyx, from great sacro-sciatic ligament. *Insertion*: into a rough line leading from great trochanter to the linea aspera.
22. Sacrum.

PLATE XXXIII.

BONES.

- A. First Cervical Vertebra, or Atlas.
- B. First Rib.
- B¹. Last Rib.
- C. Last Lumbar Vertebra.
- D. Sacrum.
- E. Coccyx.
- F. and F¹. Ilium.
- G. Scapula.
- H. Humerus.

MUSCLES.

- 1. Trapezius.—For *origin* and *insertion*, see Plate XX. 24.
- 2. Its Occipital origin.
- 3. Its Vertebral origin.
- 4 and 5. Its Scapular insertion.
- 6. Latissimus Dorsi.—For *origin* and *insertion*, see Plate XXXI.
- 7. Its head winding round Scapula to its insertion.

- 8. Vertebral origin of Trapezius.
- 9. Iliac origin of Latissimus Dorsi.
- 10. Sacral origin.
- 11. Infra-Spinatus.—For *origin* and *insertion*, see Plate XXXII. 12.
- 12. Teres Minor.—For *origin* and *insertion*, see Plate XXXII. 13.
- 13. Teres Major.—For *origin* and *insertion*, see Plate XXX. 14.
- 14. Long Head of Triceps.
- 15. Deltoid.
- 16. Obliquus Abdominis Externus.—For *origin* and *insertion*, see Plate XXX. 8.
- 17. Obliquus Abdominis Internus.—For *origin* and *insertion*, see Plate XXXI. 8.
- 18. Lumbar Fascia.
- 19. Splenius.—For *origin* and *insertion*, see Plate XXI. 22.
- 20. Sterno-Mastoid.—For *origin* and *insertion*, see Plate I.

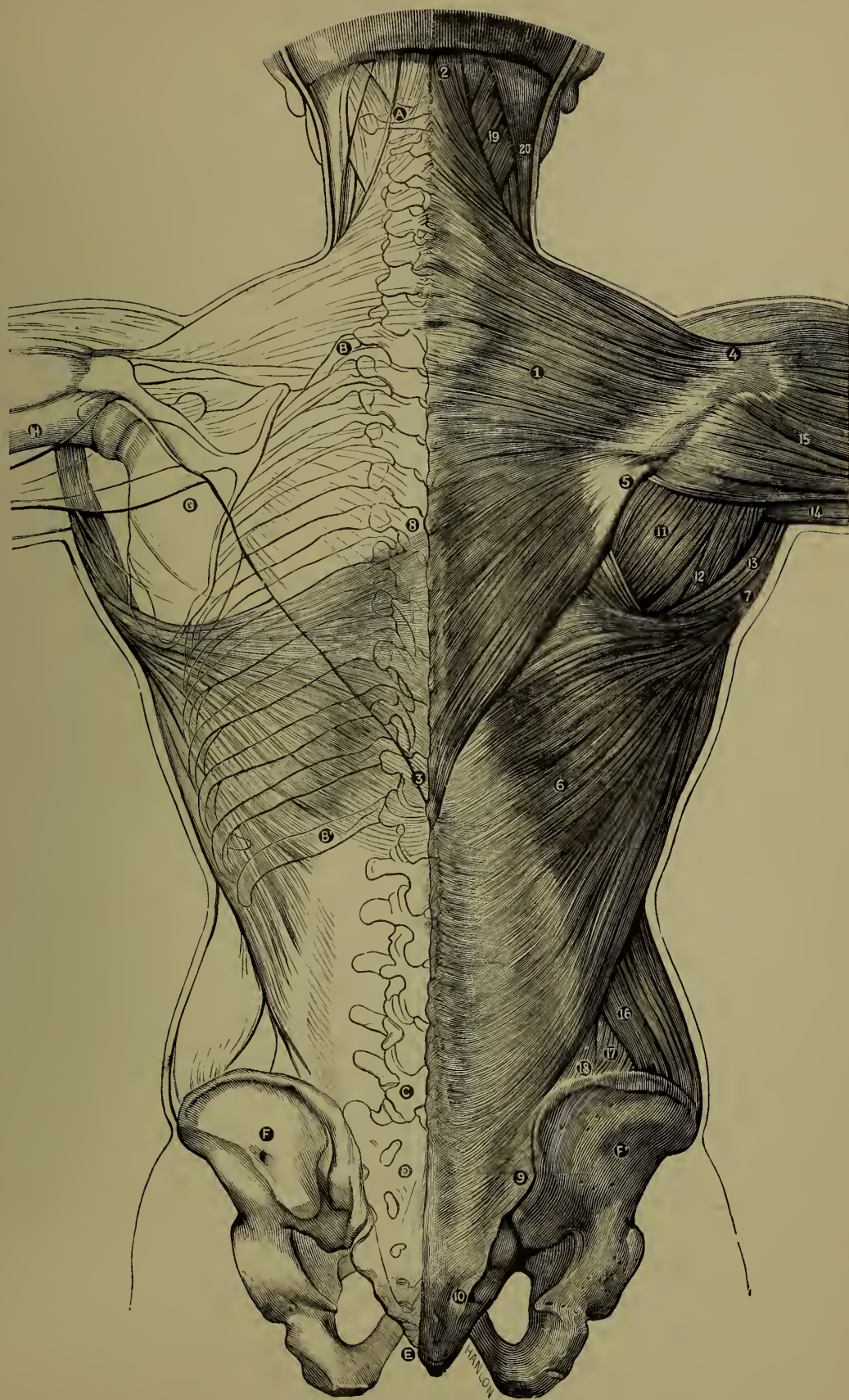


PLATE XXXIV.—BACK, DEEP LAYER.

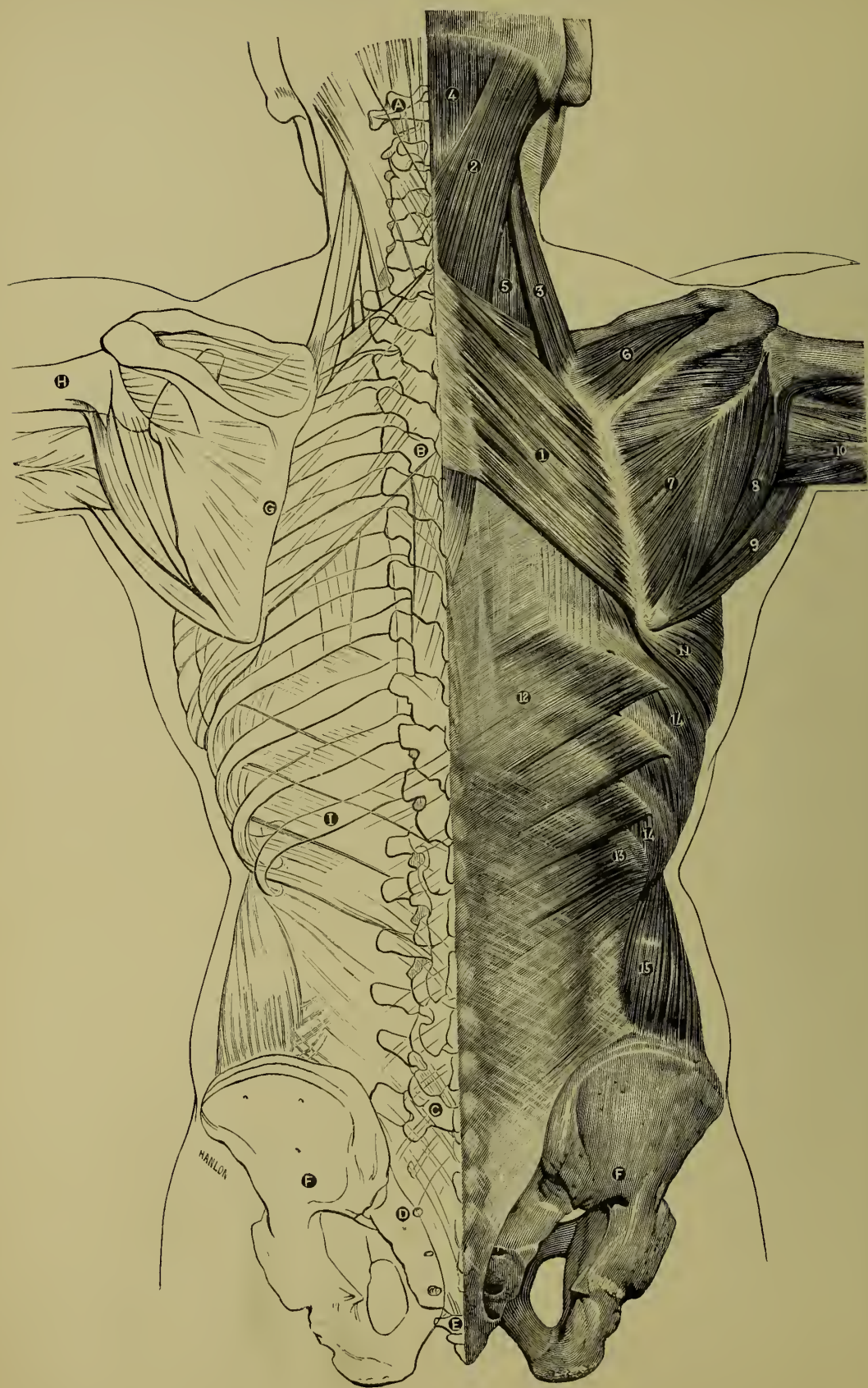


PLATE XXXIV.

BONES.

- A. First Cervical Vertebra, or Atlas.
- B. Fourth Dorsal Vertebra.
- C. Last Lumbar Vertebra.
- D. Sacrum.
- E. Coccyx.
- F. Ilium.
- G. Scapula.
- H. Humerus.
- I. Last rib.

MUSCLES.

1. Rhomboideus Major.—*Origin*: spinous processes of upper fourth or fifth dorsal vertebræ, *inserted* into vertebral border of inferior angle of Scapula.

1¹. Rhomboideus Minor.—*Origin*: spine of seventh cervical and first dorsal vertebra. *Insertion*: into the triangular surface at the root of the spine of scapula.

2. Splenius.—For *origin* and *insertion*, see Plate XXI. 22.

3. Levator Anguli Scapulæ.—For *origin* and *insertion*, see Plate XX. 27.

4. Complexus.—*Origin* and *insertion*, see Plate XX. 26.

5. Scalenus Posticus.—*Origin*: posterior tubercles of all the cervical vertebræ except the first. *Insertion*: first and second ribs.

6. Supra-Spinatus.—*Origin*: supra-spinatus fossa of scapula. *Insertion*: upper facet on great tuberosity of humerus.

7. Infra-Spinatus.—For *origin* and *insertion*, see Plate XXXII. 12.

8. Teres Minor.—For *origin* and *insertion*, see Plate XXXII. 13.

9. Teres Major.—For *origin* and *insertion*, see Plate XXX. 14.

10. Long Head of Triceps.

11. Serratus Magnus.—For *origin* and *insertion*, see Plate XXIX.

12. Serratus Posticus Inferior.—*Origin*: spines of last two dorsal and two or three upper lumbar vertebræ. *Insertion*: lower borders of the four lower ribs a little beyond the angles.

13. Last Head of Serratus Posticus Inferior.

14. Intercostales.

15. Obliquus Abdominis Internus.—For *origin* and *insertion*, see Plate XXXI. 8.

PLATE XXXV.

FIG. I. BONES.

- A. Crest of Ilium. C. Tibia.
B. Patella. D. Head of Fibula.

MUSCLES.

1. Obliquus Abdominis Externus.—For *origin* and *insertion*, see Plate XXX. 8.
2. Aponeurosis of Obliquus Abdominis Externus.
3. Sartorius.—*Origin*: anterior superior iliac spine, and half the notch below it. *Insertion*: into upper part of inner surface of shaft of tibia as far as the crest.
4. Origin of Sartorius. 5. Its insertion.
6. Rectus Femoris.—*Origin*: by two tendons—one from anterior inferior iliac spine; second from margin of acetabulum. *Insertion*: into patella with the vasti and crureus.
7. Head of Rectus as it disappears.
8. Its Tendon. 9. Its insertion.
10. Ligamentum Patellæ.
11. Tensor Vaginæ Femoris.—*Origin*: anterior part of the outer tip of the crest of ilium and anterior superior spinous process. *Insertion*: into fascia lata. 12. Its origin. 13. Its insertion.
14. Psoas and Iliacus.—For *origin* and *insertion* of Psoas, see Plate XXXVIII. ii. 2. Iliacus.—*Origin*: iliac fossa of ilium. *Insertion*: lesser trochanter.
15. Pectineus.—*Origin*: ilio-pectineal line and surface of bone in front of it. *Insertion*: into a line leading from trochanter minor to linea aspera.
16. Adductor Longus.—*Origin*: from front of pubes at the angle of junction of the crest with symphysis. *Insertion*: into middle of linea aspera.
17. Adductor Magnus.—*Origin*: from part of descending ramus of pubes and part of ascending ramus of ischium and outer margin of tuberosity of ischium. *Insertion*: into whole length of linea aspera of femur.
18. Gracilis.—*Origin*: inner margin of ramus of pubes and ischium. *Insertion*: into upper part of inner surface of shaft of tibia.
19. Vastus Externus.—*Origin*: from outer border of great trochanter, from a line leading from great trochanter to linea aspera, and from outer tip of linea aspera. *Insertion*: into upper and outer part of patella.
20. Vastus Internus.—*Origin*: from lower part of line which leads from neck of femur to linea aspera, and from inner tip of linea aspera. *Insertion*: patella. 21. Its insertion.
22. Tibialis Anticus.—*Origin*: outer tuberosity and upper two-thirds of the external surface of the shaft of tibia. *Insertion*: inner and under surface

of internal cuneiform bone and base of metatarsal bone of great toe.

23. Peroneus Longus.—*Origin*: head and upper two-thirds of outer surface of shaft of fibula. *Insertion*: outer side of metatarsal bone of great toe.

24. Soleus.—*Origin*: back part of head of fibula and upper half of posterior surface of the shaft, from oblique line on tibia and middle third of its internal border. *Insertion*: by the tendo Achillis into the os calcis.

25. Gastrocnemius.—*Origin*: two heads. *Inner*: from upper and back part of internal condyle. *Outer*: upper and back part of external condyle. *Insertion*: by the tendo Achillis into the os calcis.

26. Capsular Ligament of Knee.

FIG. II. BONES.

A. Great Trochanter.

MUSCLES.

1. Obliquus Abdominis Externus.—For *origin* and *insertion*, see Plate XXX. 8.
2. Fascia over Gluteal region.
3. Gluteus Maximus.—For *origin* and *insertion*, see Plate XXXII. 21.
4. Its origin at Crest of Ilium.
5. Its Sacral origin. 6. Its Fascial attachments.
7. Its insertion into Great Trochanter.
8. Vastus Externus.—For *origin* and *insertion*, see above, Fig. i.
9. Biceps Femoris.—*Origin*: by two heads—the *long*, from upper and back part of tuberosity of ischium; *short* head, from outer tip of linea aspera. *Insertion*: into outer side of the head of the fibula.
10. Short Head of Biceps. 11. Its Tendon.
12. Semi-Tendinosus.—*Origin*: from tuberosity of ischium. *Insertion*: into upper part of the inner surface of the shaft of the tibia.
13. Semi-Membranosus.—*Origin*: upper and outer part of the tuberosity of ischium. *Insertion*: in three parts—the *middle*, into the back part of the tuberosity of tibia; *internal*, into a groove on the inner side of tuberosity; *posterior*, back part of outer condyle of femur.
14. Gracilis.—For *origin* and *insertion*, see above, Fig. i.
15. Sartorius.—For *origin* and *insertion*, see above, Fig. i.
16. Adductor Magnus.—For *origin* and *insertion*, see above, Fig. i.
- 17 and 18. Gastrocnemius.—For *origin* and *insertion*, see above, Fig. i.
19. Expansion of the tendinous origin of Gastrocnemius, forming a covering for the fleshy fibres.

PLATE XXXV.—THIGH, BACK AND FRONT.



Fig. i.



Fig. ii.

PLATE XXXVI.—THIGH, MIDDLE LAYER.



Fig. i.



Fig. ii.

PLATE XXXVI.

FIG. I. BONES.

- A. Articular surface of Sacrum.
- B. Patella.

MUSCLES.

- 1. Tensor Vaginæ Femoris.—For *origin* and *insertion*, see Plate XXXV. i. 11.
- 2. Gluteus Minimus.—*Origin*: the whole space on the back of the ilium between the superior and inferior curved lines. *Insertion*: into the anterior border of the great trochanter.
- 3. Head of Rectus Femoris.
- 4. Body of Rectus Femoris.
- 5. Its Tendon.
- 6. Pectineus.—For *origin* and *insertion*, see Plate XXXV. i. 15.
- 7. Head of Adductor Longus.
- 8. Body of Adductor Longus.
- 9. Origin of Gracilis.
- 9'. Adductor Magnus.
- 10. Body of Gracilis.

- 11. Vastus Internus.—For *origin* and *insertion*, see Plate XXXV. i. 20.
- 12. Vastus Externus.—For *origin* and *insertion*, see Plate XXXV. i. 19.
- 13. Cut edge of Fascia.
- 14. Tubercle of Tibia.

FIG. II. BONES.

- A. Tibia.
- B. Fibula.
- C. Neck of Femur enclosed by the capsular ligament.

MUSCLES.

- 1. Cut end of Rectus.
- 2. Cut end of Gluteus Minimus.
- 3. Cut end of Psoas.
- 4. Pectineus.—For *origin* and *insertion*, see Plate XXXV. i. 15.
- 5. Upper part of Vastus Internus.
- 6. Its tendinous origin at Femur.
- 7. Cut end of Fascia Lata.

PLATE XXXVII.

FIG. I.

BONES.

- A. Ilium.
- B. Femur.

MUSCLES.

- 1. Cut Tendon of Rectus Femoris.
- 2. Pectineus.—For *origin* and *insertion*, see Plate XXXV. i. 15.
- 3. Adductor Longus.—For *origin* and *insertion*, see Plate XXXV. i. 16.
- 4. Adductor Magnus.—For *origin* and *insertion*, see Plate XXXV. i. 17.
- 5. Its lower insertion.
- 6. Cut Tendon of Psoas.
- 7. Quadratus Femoris.—*Origin*: from outer border of the tuberosity of ischium. *Insertion*

into upper part of linea quadrati on the posterior surface of trochanter.

8. Obturator Externus.—*Origin*: from around the inner side of obturator foramen and also from body and ramus of pubes, and the ramus of the ischium, and from the obturator membrane. *Insertion* into digital fossa of femur.

FIG. II.

- 1. Obturator Externus.—See above, i. 8.
- 2. Quadratus Femoris.—See above, i. 7.
- 3. Adductor Brevis.—*Origin*: outer margin of descending ramus of pubes. *Insertion*: into upper part of linea aspera.
- 4. Adductor Magnus.—For *origin* and *insertion*, see Plate XXXV. i. 17.

PLATE XXXVII.—THIGH, DEEP LAYER.

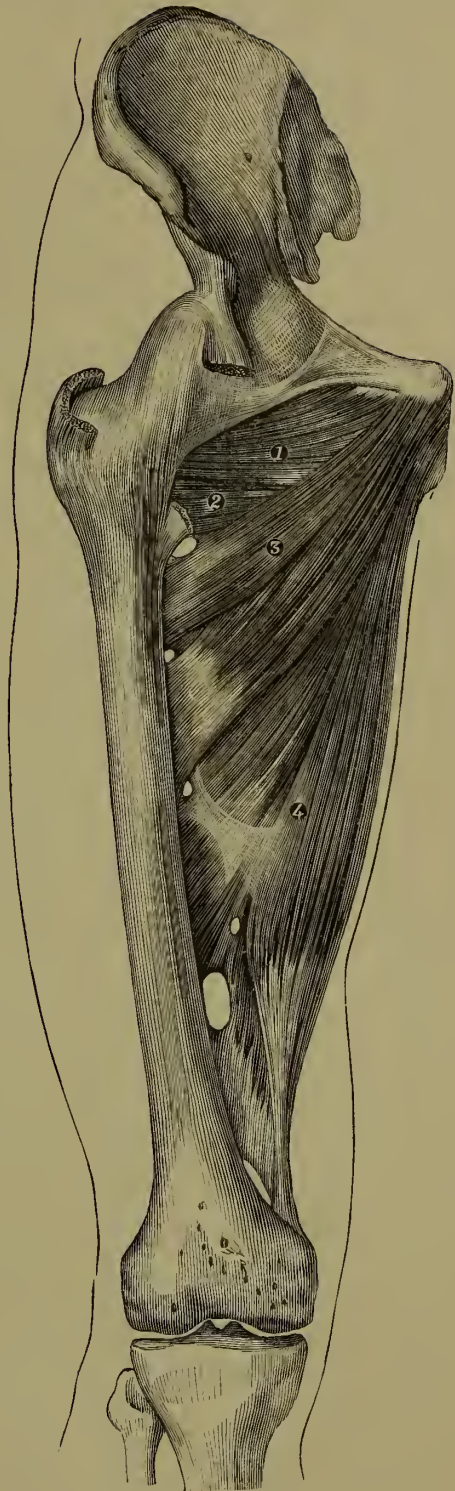


PLATE XXXVIII.—THIGH, OUTSIDE AND INSIDE VIEWS.



Fig. i.



Fig. ii.

PLATE XXXVIII.

FIG. I.

BONES.

A. Great Trochanter.

MUSCLES.

1. Obliquus Abdominis Externus.—For *origin* and *insertion*, see Plate XXX. 8.
2. Gluteus Maximus.—For *origin* and *insertion*, see Plate XXXII. 21.
3. } Its insertion into Femur.
4. }
5. Its insertion into Trochanter.
6. Gluteus Medius.—For *origin* and *insertion*, see Plate XXXII. 20.
7. Fascia which covers the Buttock.
8. Tensor Vaginæ Femoris.—For *origin* and *insertion*, see Plate XXXV. i. 11.
9. Its origin.
10. Its insertion into Fascia Lata.
11. Sartorius.—For *origin* and *insertion*, see Plate XXXV. i. 3.
12. Vastus Externus.—For *origin* and *insertion*, see Plate XXXV. i. 19.
13. Rectus Femoris.—For *origin* and *insertion*, see Plate XXXV. i. 6.
14. Vastus Internus.—For *origin* and *insertion*, see Plate XXXV. i. 20.
15. Tendon of Quadriceps.
16. Cut end of Fascia Lata.
17. Biceps.—For *origin* and *insertion*, see Plate XXXV. ii. 9.
18. Short Head of Biceps.
19. Its Tendon.
20. Semi-Membranosus.—For *origin* and *insertion*, see Plate XXXV. ii. 13.
21. Soleus.—For *origin* and *insertion*, see Plate XXXIX. i. 6.
22. Tibialis Anticus.—For *origin* and *insertion*, see Plate XXXIX. i. 3.

FIG. II.

1. Iliacus.—For *origin* and *insertion*, see Plate XXV. i. 14.
2. Psoas.—*Origin*: from sides of the bodies of intervertebral substances, and from the bases of transverse processes of last dorsal and all the lumbar vertebrae. *Insertion*: lesser trochanter.
3. Rectus Femoris.—For *origin* and *insertion*, see Plate XXXV. i. 6.
4. Sartorius.—For *origin* and *insertion*, see Plate XXXV. i. 3.
5. Insertion of Sartorius.
6. Vastus Internus.
7. Its attachment into Patella.
8. Adductor Longus.—For *origin* and *insertion*, see Plate XXXV. i. 16.
9. Gracilis.—For *origin* and *insertion*, see Plate XXXV. i. 18.
10. Adductor Magnus.—For *origin* and *insertion*, see Plate XXXV. i. 17.
11. Semi-Membranosus.—For *origin* and *insertion*, see Plate XXXV. ii. 13.
12. Semi-Tendinosus.—For *origin* and *insertion*, see Plate XXXV. ii. 12.
13. Outer Head of Gastrocnemius.
14. Gluteus Maximus.—For *origin* and *insertion*, see Plate XXXII. 21.
15. Obturator Internus.—*Origin*: from anterior and external wall of pelvis, around inner side of obturator foramen, also from the obturator membrane, the tendon is reflected over the inner surface of the tuberosity of ischium, and is *inserted* into upper border of great trochanter.
16. Its Tendon leaving Pelvis.
17. Pyriformis.—*Origin*: from front of sacrum by three digitations from between first, second, third and fourth anterior sacral foramina, passes out of pelvis through great sacro-ischiatic foramen, and is *inserted* into upper part of great trochanter.

PLATE XXXIX.

FIG. I.
BONES.

- A. Patella.
- B. Tibia.
- C. Annular Ligament.
- D. External Malleolus.

MUSCLES.

1. Vastus Externus.—For *origin* and *insertion*, see Plate XXXV. i. 19.
2. Vastus Internus.—For *origin* and *insertion*, see Plate XXXV. i. 20.
3. Tibialis Anticus.—*Origin*: outer tuberosity and upper two-thirds from external surface of the shaft of the tibia, from interosseous membrane. *Inserted* into under surface of internal cuneiform and base of metatarsal bone of the great toe.
4. Extensor Longus Digitorum Pedis.—*Origin*: from outer tuberosity of tibia, from upper three-fourths of the anterior surface of the shaft of the fibula; and is *inserted* into the third phalanges of the four outer toes.
5. Peroneus Longus.—*Origin*: from head and upper two-thirds of the outer surface of the shaft of the fibula. *Insertion* into the base of the metatarsal bone of the great toe.
6. Soleus.—*Origin*: from back part of the head of the fibula and from upper half of the posterior surface of the shaft, from the oblique line on tibia and from middle third of its internal border. *Inserted* into tendo-Achillis and by it to os calcis.
7. Extensor Proprius Pollicis.—*Origin*: from middle two-thirds of the anterior surface of fibula

and interosseous membrane. *Insertion*: into the base of the last phalanx of great toe.

8. Peroneus Tertius.—*Origin*: lower fourth of the anterior surface of the fibula and interosseous membrane. *Insertion*: into base of the fifth metatarsal bone.

9. Its Tendon.

10. Tendon of Tibialis Anticus.

FIG. II.
BONES, same as Fig. I.

MUSCLES.

1. Cut portion of Vastus Externus.
2. Vastus Internus.—For *origin* and *insertion*, see Plate XXXV. i. 20.
3. Biceps Femoris.
4. Cut Head of Peroneus Longus.
5. Cut portion of Tibialis Anticus.
- 5A. Tendon of same.
6. Extensor Longus Digitorum.—For *origin* and *insertion*, see above, Fig. i.
7. Extensor Proprius Pollicis.—For *origin* and *insertion*, see above, Fig. i.
8. Soleus.
9. Peroneus Brevis.—For *origin* and *insertion*, see Plate XL. ii. 15.
10. Peroneus Tertius.
11. Extensor Brevis Digitorum.—*Origin*: from outer side of os calcis in front of groove for peroneus brevis. *Inserted* into second phalanges of four inner toes.
12. Tendon of Peroneus Tertius.
13. Tendon of Extensor Proprius Pollicis Pedis.



Fig. i.

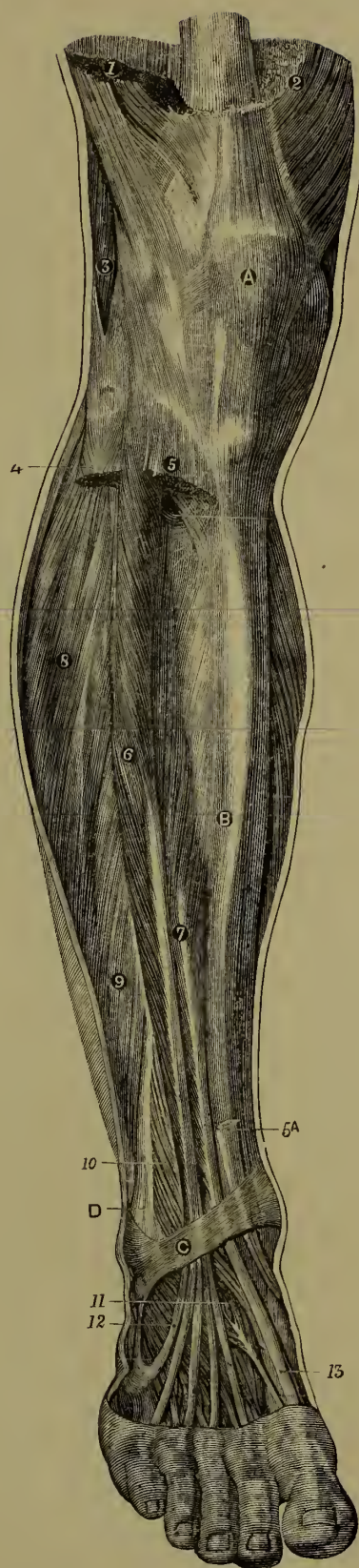


Fig. ii.

PLATE XL.—LEG, OUTSIDE AND INSIDE.



Fig. i.



Fig. ii.

PLATE XL.

FIG. I.

1. Vastus Internus.—For *origin* and *insertion*, see Plate XXXV. i. 20.
2. Sartorius.—For *origin* and *insertion*, see Plate XXXV. i. 3.
3. Semi-Membranosus.—For *origin* and *insertion*, see Plate XXXV. ii. 13.
4. Inner head of Gastrocnemius.
5. Body of above.
6. Tendo-Achillis.
7. Solens.—For *origin* and *insertion*, see Plate XXXIX. i. 6.
8. Flexor Longus Digitorum Pedis.—*Origin*: from posterior surface of tibia below the oblique line. *Insertion*: by four tendons into the bases of the last phalanges of the four outer toes.
9. Flexor Longus Pollicis.—*Origin*: from lower two-thirds of the internal surface of the shaft of the fibula and lower part of interosseous membrane. *Insertion*: into base of the last phalanx of great toe.
10. Tendon of Tibialis Posticus.
11. Tibialis Anticus.—For *origin* and *insertion*, see Plate XXXIX. i. 3.
12. Tendon of above.
13. Abductor Pollicis.

FIG. II.

1. Rectus Femoris.—For *origin* and *insertion*, see Plate XXXV. i. 6.

2. Vastus Externus.—For *origin* and *insertion*, see Plate XXXV. i. 19.
3. Cut portion of Fascia Lata.
4. Ligamentum Patellæ.
5. Biceps Femoris.—For *origin* and *insertion*, see Plate XXXV. ii. 9.
6. Its Tendon.
7. Outer Head of Gastrocnemius.
8. Soleus.
9. Its insertion into the Os Calcis.
10. Peroneus Longus.—For *origin* and *insertion*, see Plate XXXIX. i. 5.
11. Its Tendon passing round external malleolus.
12. Its Tendon passing under the sole of foot.
13. Peroneus Tertius.—For *origin* and *insertion*, see Plate XXXIX. i. 8.
14. Its insertion into Metacarpal bone.
15. Peroneus Brevis.—*Origin*: middle third of the external surface of the shaft of the fibula, from anterior and posterior surfaces of the bone. *Insertion*: base of fifth metatarsal bone.
16. Extensor Longus Digitorum Pedis.—For *origin* and *insertion*, see Plate XXXIX. i. 4.
17. Tibialis Anticus.—For *origin* and *insertion*, see Plate XXXIX. i. 3.
18. Tendons of Extensor Longus Digitorum.
19. Extensor Brevis Digitorum.—For *origin* and *insertion*, see Plate XXXIX. ii. 11.
20. Abductor Minimi Digiti.

PLATE XLI.

FIG. I.

BONES.

- A. Back of Femur—same in three diagrams.

MUSCLES.

1. Biceps Femoris.—For *origin* and *insertion*, see Plate XXXV. ii. 9.
2. Semi-Membranosus.—For *origin* and *insertion*, see Plate XXXV. ii. 13.
3. Semi-Tendinosus.—For *origin* and *insertion*, see Plate XXXV. ii. 12.
4. Tendinous edge of Semi-Membranosus.
5. Gracilis.—For *origin* and *insertion*, see Plate XXXV. i. 18.
6. Sartorius.—For *origin* and *insertion*, see Plate XXXV. i. 3.
7. Inner Head of Gastrocnemius.
8. Plantaris.—*Origin*: lower part of the outer bifurcation of the linea aspera and from posterior ligament of the knee-joint. *Inserted* into posterior part of os calcis.
9. Outer Head of Gastrocnemius.
- 10 and 11. Insertion of the two portions of Gastrocnemius into the tendo-Achillis.

FIG. II.

1. Posterior inferior origin of Vastus Externus.
2. Vastus Externus.
3. Cut Tendon of Biceps Femoris.
4. Vastus Internus.
5. Cut Tendon of Adductor Magnus.
6. Cut Inner Head of Gastrocnemius.
7. Cut Outer Head of Gastrocnemius.

8. Plantaris.—For *origin* and *insertion*, see Fig. i.
9. Popliteus.—*Origin*: from a depression on the outer side of external condyle. *Insertion*: into the triangular surface of the tibia above the oblique line.

10. Tendon of Semi-Membranosus.
11. Soleus.—For *origin* and *insertion*, see Plate XXXIX. i. 6.
12. Cut portions of Gastrocnemii.
13. Tendo-Achillis.
14. Peroneus Longus.—For *origin* and *insertion*, see Plate XXXIX. i. 5.
15. Peroneus Brevis.—For *origin* and *insertion*, see Plate XXXIX. ii. 9.
16. Fleishy part of Flexor Longus Pollicis.
17. Insertion of Tendo-Achillis.
18. Flexor Longus Pollicis.—For *origin* and *insertion*, see Plate XL. i. 9.
19. Flexor Longus Digitorum.—For *origin* and *insertion*, see Plate XL. i. 8.
20. Tibialis Posticus.—*Origin*: from upper two-thirds of interosseous membrane and the adjacent surfaces of tibia and fibula. *Insertion*: into the tubercle of the scaphoid.

FIG. III.

- A. Posterior part of Femur.

MUSCLES.

7. Inner Head of Gastrocnemius.
8. Plantaris.
9. Outer Head of Gastrocnemius.
10. } Fleishy margins of Gastrocnemius.
11. }



Fig. i.

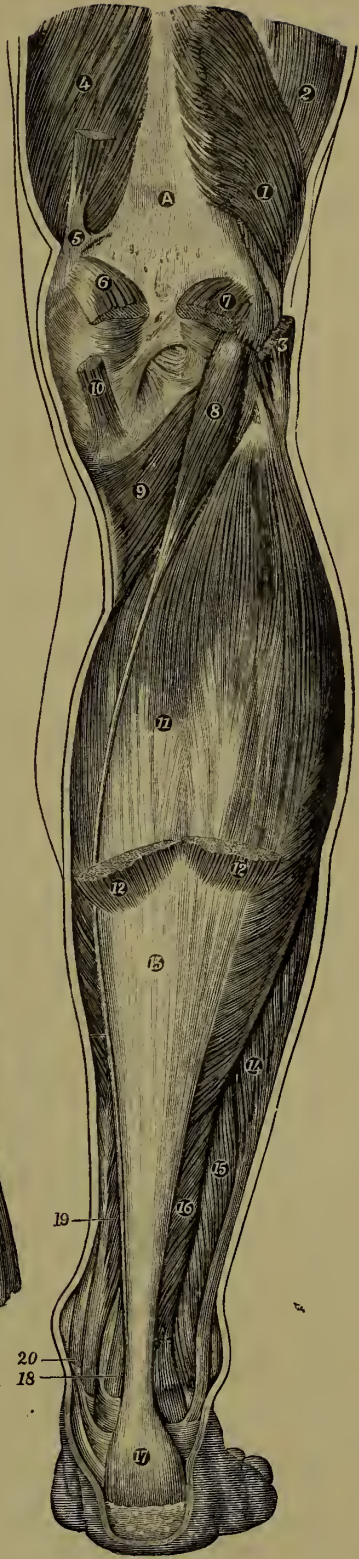


Fig. ii.

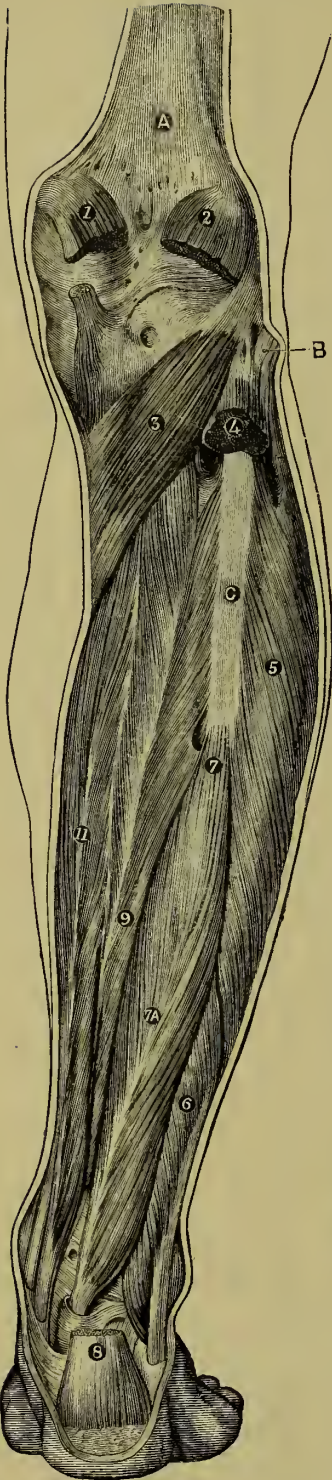


Fig. i.

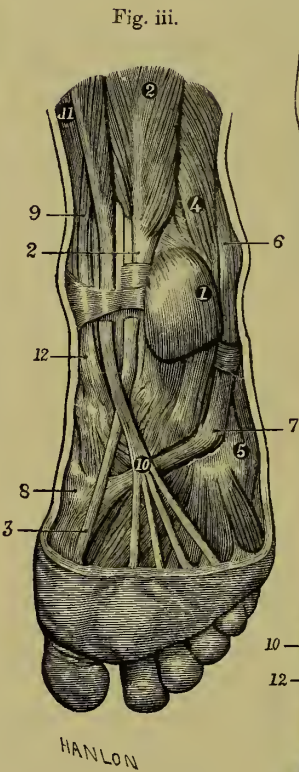


Fig. iii.

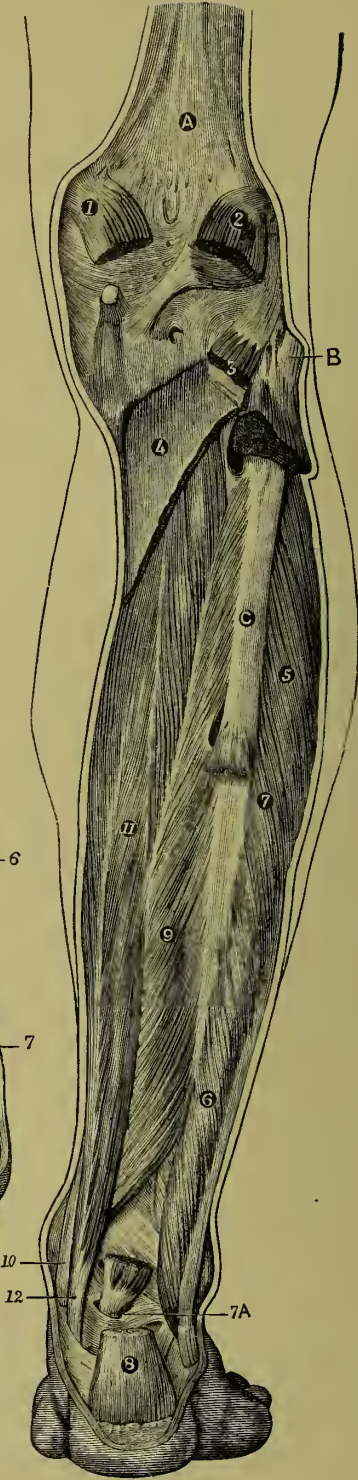


Fig. ii.

PLATE XLII.

FIG. I.

BONES.

- A. Femur.
- B. Head of the Fibula.
- C. Fibula.

MUSCLES.

- 1. Inner } Heads of Gastrocnemius.
- 2. Outer }
- 3. Popliteus.—For *origin and insertion*, see Plate XLI. ii. 9.
- 4. Cut portion of Soleus.
- 5. Peroneus Longus.—For *origin and insertion*, see Plate XXXIX. i. 5.
- 6. Peroneus Brevis.—For *origin and insertion*, see Plate XXXIX. ii. 9.
- 7. Flexor Longus Pollicis.—For *origin and insertion*, see Plate XX., Fig. 1.
- 7A. Body of Flexor Longus Pollicis.
- 8. Cut end of Tendo-Achillis.
- 9. Tibialis Posticus.—For *origin and insertion*, see Plate XLI. ii. 20.
- 11. Flexor Longus Digitorum.—For *origin and insertion*, see Plate XL. i. 8.

FIG. II.

BONES.

- A. Femur.
- B. Head of Fibula.
- C. Fibula.

MUSCLES.

- 1. Inner } Heads of Gastrocnemii.
- 2. Outer }
- 3. Cut origin of Popliteus.
- 4. Cut origin of Soleus.
- 5. Peroneus Longus.—For *origin and insertion* see Plate XXXIX. i. 5.
- 6. Peroneus Brevis.—For *origin and insertion* see Plate XXXIX. ii. 9.
- 7. Cut origin of Flexor Longus Pollicis.
- 7A. Cut tendon of the same.
- 8. Cut end of Tendo-Achillis.
- 9. Tibialis Posticus.—For *origin and insertion* see Plate XLI. ii. 20.
- 10. Tendon of above.
- 11. Flexor Longus Digitorum.—For *origin and insertion*, see Plate XL. i. 8.
- 12. Tendon of above.

FIG. III.

- 1. Os Calcis.
- 2. End of Flexor Longus Pollicis.
- 3. Tendon of above.
- 4. Peroneus Brevis.
- 5. Insertion of above.
- 6 and 7. Tendon of Peroneus Longus.
- 8. Attachment of above.
- 9. Tendon of Tibialis Posticus.
- 10. Tendon of Flexor Longus Digitorum.
- 11. Tibialis Posticus.
- 12. Tendon of Tibialis Posticus.

PLATE XLIII.

FIG. I. BONE.

A. Tibia.

MUSCLES.

1. Peroneus Longus.—For *origin* and *insertion*, see Plate XXXIX. i. 5.
2. Peroneus Tertius.—For *origin* and *insertion*, see Plate XXXIX. i. 8.
3. Its attachment.
4. Tendons of Extensor Longus Digitorum.
5. Extensor Proprius Pollicis, seen through Annular Ligament.
6. Tendon of Tibialis Anticus.
7. The same passing round the side of foot.
8. Soleus.
9. First Dorsal Interosseous.
10. Extensor Brevis Digitorum.—For *origin* and *insertion*, see Plate XXXIX. ii. 11.
11. Flexor Brevis Minimi Digiti.—For *origin* and *insertion*, see below, Fig. ii. 9.
12. Metatarso Phalangeal Ligament.

FIG. II.

1. Plantar Fascia.
2. Abductor Pollicis.—*Origin*: from the inner tuberosity on the under surface of os calcis, from internal annular ligament and plantar fascia. *Insertion*: into bone of first phalanx of great toe.
3. Flexor Brevis Pollicis.—*Origin*: from cuboid, external cuneiform bone, and from tendon of tibialis

posticus. *Inserted* in two parts, one on either side of the base of the first phalanx of great toe.

4. Flexor Brevis Digitorum.—*Origin*: from inner tubercle of os calcis from plantar fascia. *Insertion*: by four tendons into the sides of the second phalanges of the four outer toes.

5. Tendon of Flexor Longus Pollicis.

6. Abductor Minimi Digiti.—*Origin*: from outer tuberosity of the os calcis and plantar fascia. *Insertion*: into outer side of the base of first phalanx of the little toe.

7. Its attachment to the fifth Metatarsal Bone.

8. Its body.

9. Flexor Brevis Minimi Digiti.—*Origin*: from base of metatarsal bone of little toe. *Insertion*: into base of first phalanx of little toe.

10. Lumbricales.

11. Interosseous.

FIG. III.

1. Tendon of Flexor Longus Pollicis.
2. Tendon of Flexor Longus Digitorum.
3. Outer } Heads of Flexor Brevis Pollicis.
4. Inner }

Flexor Accessorius. *Origin*: by two heads —inner, from inner concave surface of os calcis; outer, under surface of os calcis, in front of outer tubercle. *Insertion*: into tendon of flexor longus.

7. Tendon of Peroneus Longus.

8. Flexor Brevis Minimi Digiti.

PLATE XLIII.—FOOT, UPPER SURFACE AND SOLE.

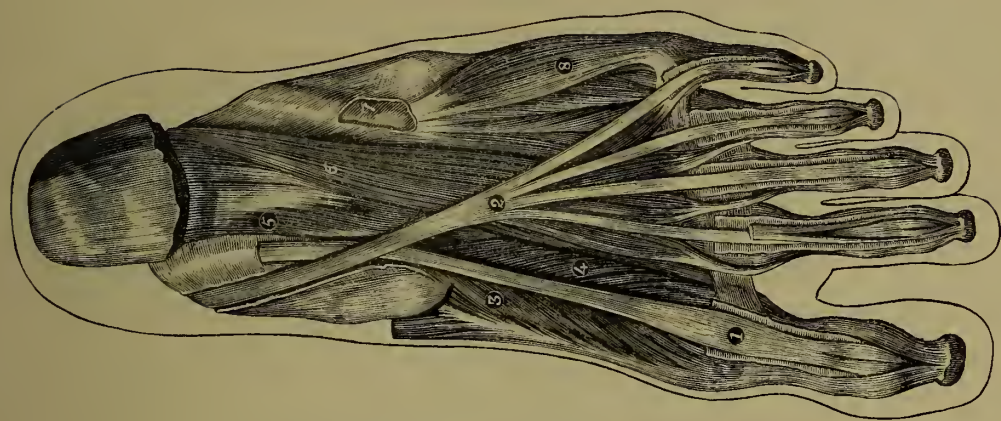


Fig. iii.

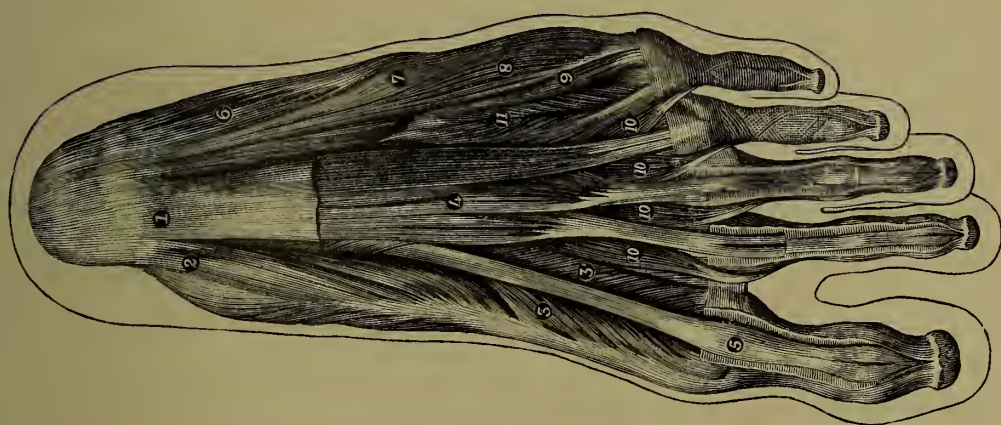


Fig. ii.

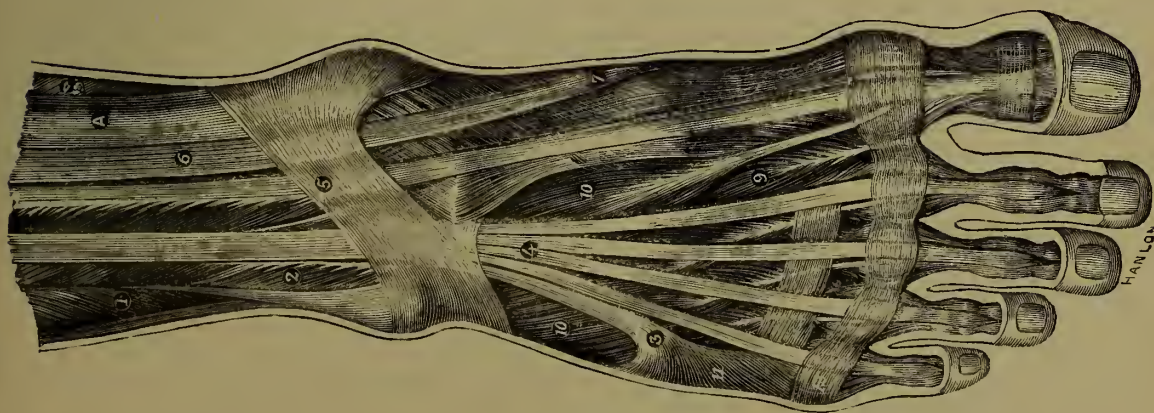


Fig. i.

HANLON

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THE END



